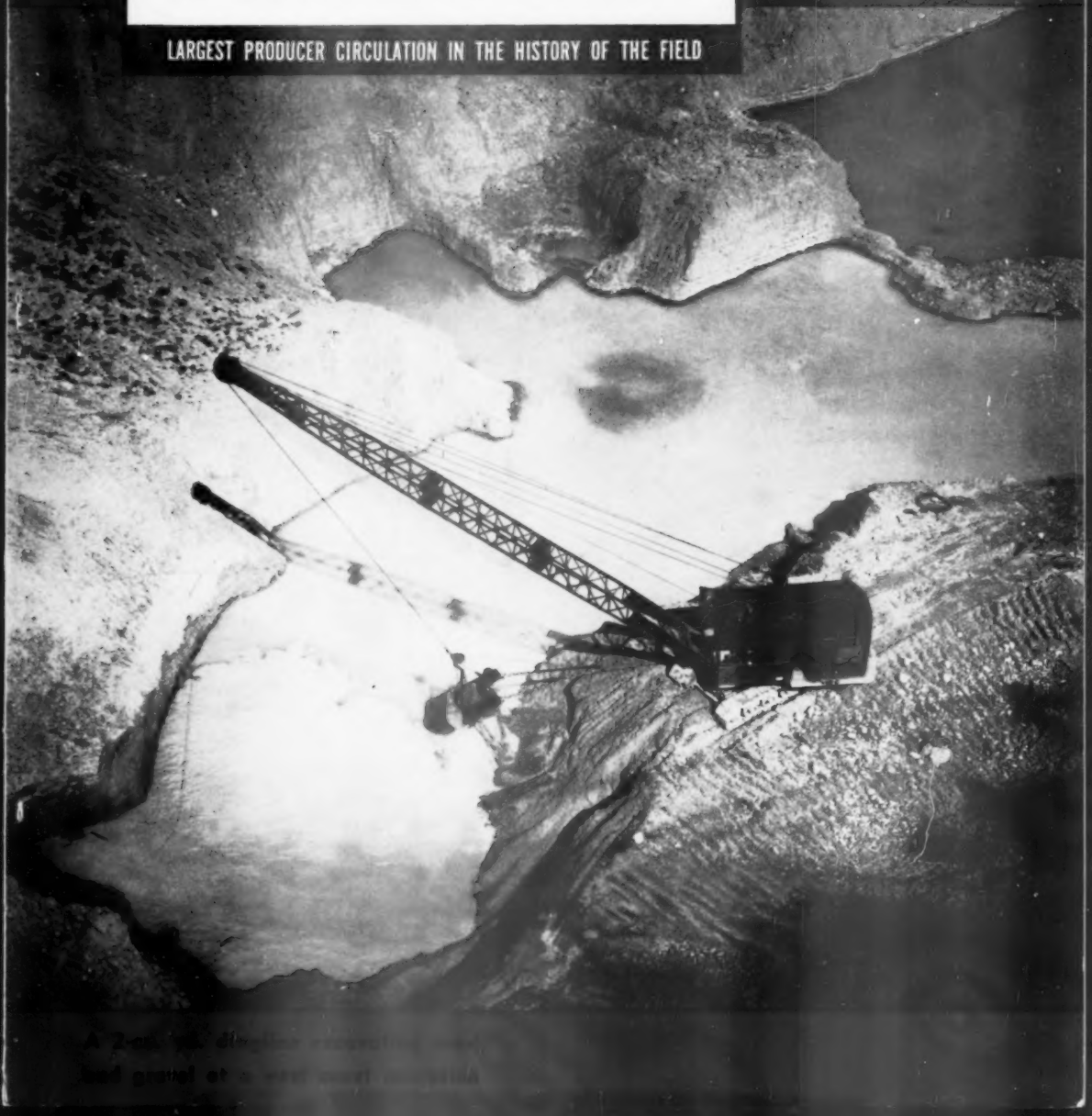
THE INDUSTRY'S RECOGNIZED AUTHORITY

ROCK PRODUCTS

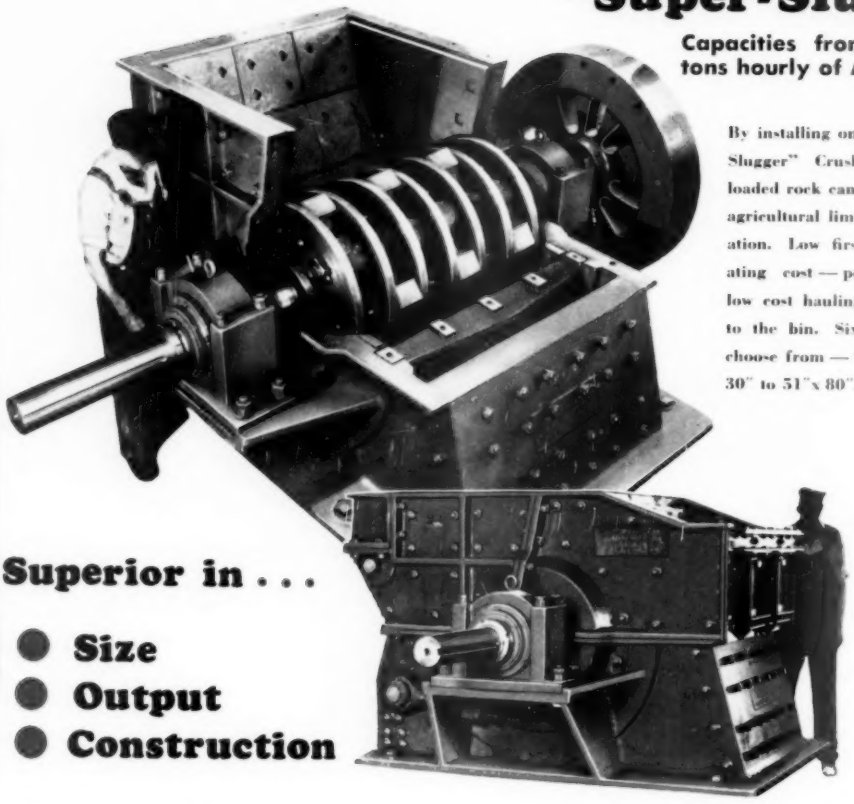
LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD



"POWER SHOVEL LOADED ROCK TO AGSTONE IN ONE OPERATION"

WITH THE WILLIAMS "Super-Slugger"

Capacities from 30 to 150 tons hourly of Agstone



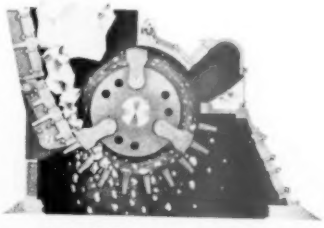
By installing one Williams "Super-Slugger" Crusher, power shovel loaded rock can now be reduced to agricultural limestone in one operation. Low first cost — low operating cost — permits mechanical, low cost hauling from the deposit to the bin. Six standard sizes to choose from — feed openings 41"x 30" to 51"x 80".

Superior in . . .

- **Size**
- **Output**
- **Construction**

Williams has pioneered the idea of one large hammer mill reducing quarry run stone to small sizes in one operation, and the "Super-Slugger" now represents the accumulated experience gained in many years of such work. The "Super-Slugger" is an extra heavy duty crusher, designed for operators requiring high tonnage output, great strength and the capacity to reduce power shovel stone to desired sizes in one operation.

Williams also manufacture the now famous "Slugger" and "NF" Crushers and pulverizers. The "Slugger" will take one man stone and reduce to $1\frac{1}{4}$", $\frac{3}{4}$" or Agstone in one operation, while the "NF" is supreme as a regrinder, taking 4" and smaller stone. Both are built in various standard sizes, affording a type and size for all operators. Quotations gladly made upon request.



Sectional View above shows operation of the Williams Hammer Principle of Crushing.

The Williams Patent Crusher & Pulverizer Co.
800 St. Louis Ave. St. Louis 6, Mo.

OLDEST AND LARGEST BUILDERS OF HAMMERMILLS IN THE WORLD

PATENT CRUSHERS GRINDERS SHREDDERS

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for
HIGHER EFFICIENCY,
LOWER COSTS
with
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Belt Conveyors . . Bucket Elevators . . Carriers . . Chains . . Sand Classifiers . . Apron Conveyors . . Flight Conveyors . . Gravel and Stone Gates . . Conical Screens . . Revolving Screens . . Vibrating Screens . . Screw Conveyors . . Screw Washers . . Scrubbers . . Sand Separators . . Shovels—Cranes—Draglines . . Speed Reducers . . Variable Speed Transmissions . . Sprocket Wheels . . Paddle Washers . . and other Elevating, Conveying and Power Transmission Accessories.

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MAY, 1949

ROCK PRODUCTS

THE INDUSTRY'S RECOGNIZED AUTHORITY

VOL. 52, No. 5

Bror Nordberg
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Nathan C. Rockwood
Editorial Consultant

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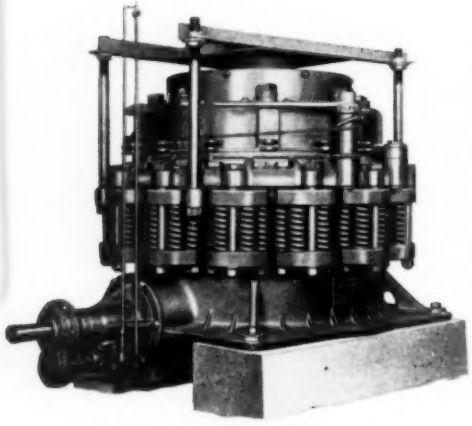

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For Fine Aggregate Production For Making Sand of Proper Gradation and Quality

IN the construction of huge dams in America and other parts of the world which were built for reclamation, flood control and hydro-electric power generation, Symons Cones have been used for producing the wide variety of finely crushed materials that were required. In addition to producing millions of tons of aggregate, Symons Cones are widely used for preparing sand to meet the rigid specifications that are becoming more and more prevalent in concrete construction.

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WANTED!
Sturdy, dependable shovel, for tough quarry work. Must be able to put in long hours of work without expensive maintenance, load 1,000,000 tons a year. Box 120-B
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LAWN SPRINKLER: All tools, died, fix-tures and substantial inventory; ready for manufacture; $2,000. liable local manufacturer.

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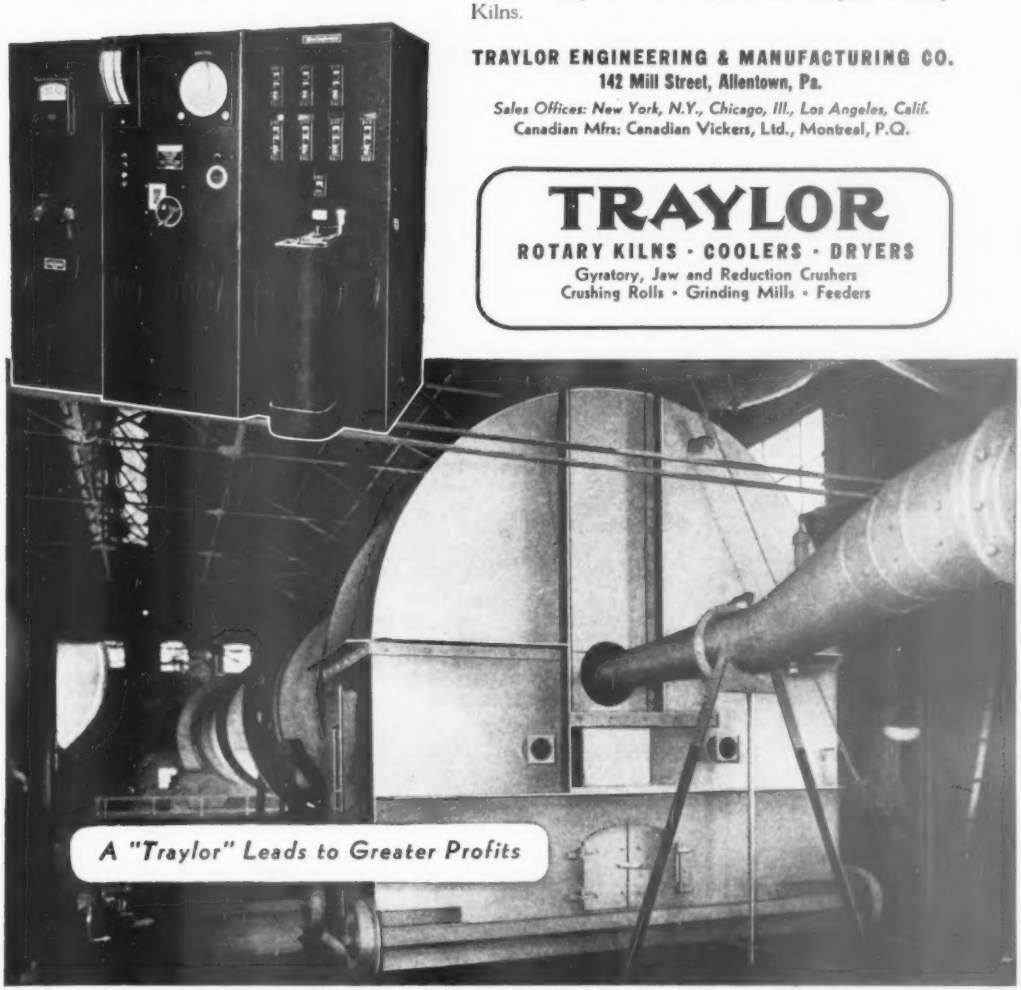
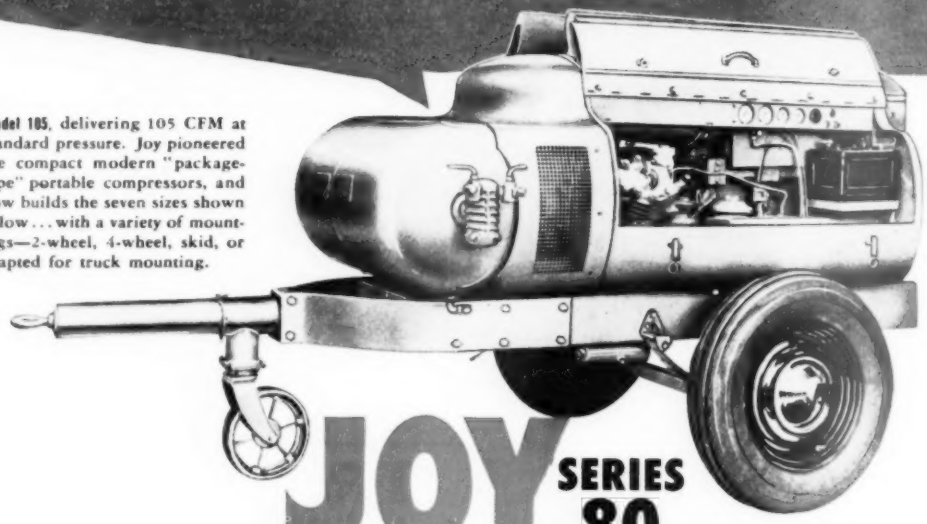
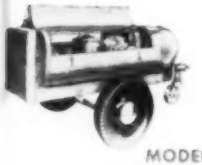


Here's *Portable* AIR POWER at Lowest Cost and Topmost Efficiency

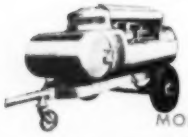
Model 185, delivering 105 CFM at standard pressure. Joy pioneered the compact modern "package-type" portable compressors, and now builds the seven sizes shown below . . . with a variety of mountings—2-wheel, 4-wheel, skid, or adapted for truck mounting.



JOY SERIES 80 PORTABLE COMPRESSORS



MODEL 60



MODEL 160

MODEL 210

Compare these Features!

- ★ **2 STAGE COMPRESSION**
- ★ **AUTOMATIC "ECONO-MISER" LOAD CONTROL**
- ★ **SEVEN SIZES—60 TO 630 CFM**
- ★ **NOTHING TO MATCH THEM FOR MODERN, COMPACT DESIGN—PORTABILITY—RELIABLE AND EFFICIENT OPERATION**

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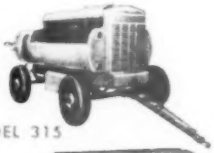
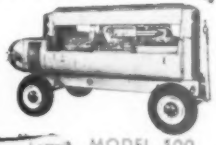


MODEL 315



MODEL 500

MODEL 630

WBD C 2074

Consult a Joy Engineer

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HARD ROCK LUG for severest off-the-road service

ROAD LUG for service OFF and ON the road

Super-tough
for pit and quarry service

IT takes something special to do a super job, and that's why Goodyear designed these two special work-horse tires. They're practically custom-built to meet the various needs of pit and quarry hauling. The Hard Rock Lug is the tire for off-the-road duty. The Road Lug the choice for both *on* and *off* the road.

Buy the tires that are *right* for your hauling needs — Goodyear job-proven tires — they provide the *right* answer to long-life operation at lowest-cost per-ton-mile in mine and quarry hauling.

Both the Hard Rock Lug and Road Lug are built with super-strong rayon cord and extra-heavy treads. Each rolls on a tread specially designed for its own type of work. Ask your Goodyear dealer now to recommend the tire that's best for your operation.

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Road Lug—T.M. The Goodyear Tire & Rubber Company

7 Reasons WHY DUMPTOR Maintenance Cost Stays Low in Toughest Service

The hauling unit built by a shovel manufacturer for work with shovels.

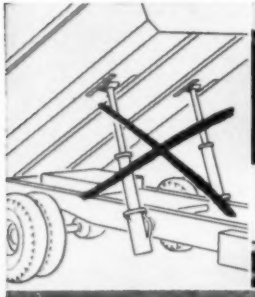
LESS TIME OFF . . . MORE TIME TO HAUL because:

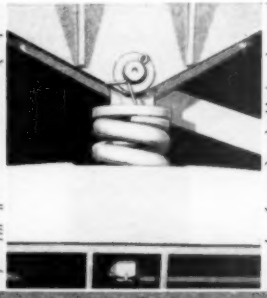
1 No Body Hoist Maintenance. Dumptor has no body hoist. Gravity alone tips 6-yard body in one second in zero weather.

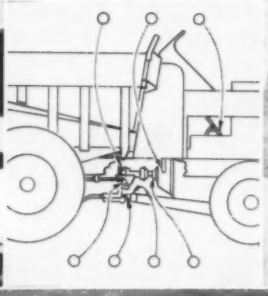
2 One Spring Only, on pivot-mounted front axle. No other springs on either axle. No spring maintenance problem.

3 Lubrication Chart shows just 7 daily lubrication points on Dumptor chassis. Daily lubrication wastes no haul-time.

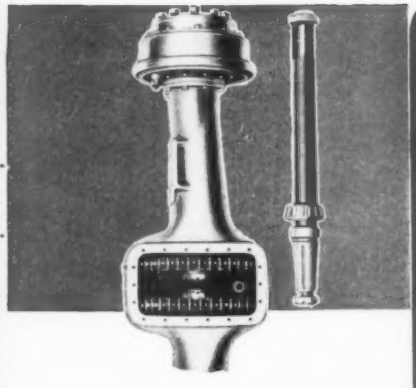
4 Big 16:00 x 24" single drive wheel tires. Special heavy duty for off-road work. No rock wedging between duals.





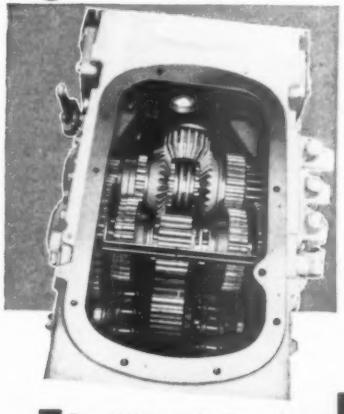


KOEHRING CO. MILWAUKEE 10, WISCONSIN



5 No Dumptor drive axle has ever been broken in rock. They're chrome nickel steel, 4" in diameter, in heavy cast steel case.

6 Kickout pan adds 3/16" steel on top of 3-layer steel-oak-steel bottom. Body sides heavily reinforced with 4" steel channels.



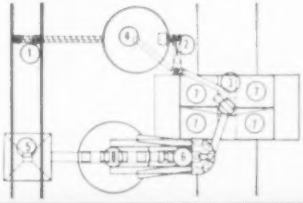
7 Transmission runs in oil . . . lasts longer. Oil changed only once a season. No need for continuous refilling. Case is oil-tight.

New JOHNSON Ready-Mix Plant Complete in ONE PACKAGE

Here's How it Works

Bulk cement, received by rail or truck, conveyed by screw conveyor from cement receiving hopper (1), to bucket elevator (2), is discharged into central cement storage compartment of bin (3), or auxiliary cement storage silo (4).

Aggregates, received in hopper bottom cars or trucks, conveyed by belt-feeder from aggregate receiving hopper (5), to aggregate bucket elevator (6), are discharged into aggregate compartments (7), of 100-yard bin or aggregate storage silo, (8), or two-in-line silos. Johnson Concentric Batcher and Johnson Water Weigh Batcher, both on batcher floor below bin, discharge into the mixer or through the other leg of 2-way batcher-discharge directly into a truck-mixer.



High Production . . . New Low Investment

Because new conveyor and elevator system provides for ground storage of both cement and aggregates, you need less overhead storage capacity. Result: Lower investment cost that reduces your cost per yard of concrete.

50% Lower Erection Cost

Erection cost of new Johnson Ready-Mix Plant is reduced by approximately 50%. Welded units can be erected in half time it takes to put up "bolted" plant. Means important saving.

Quickly, Easily Moved

Prefitted units disassemble fast. Bin sections and steel silos fit railroad cars and flatbed trucks. Ship anywhere—to bridge jobs, dam jobs, school and hospital jobs — wherever on-job mixing will pay you.

Overhead Storage Easily Increased

By adding a welded section to the elevators and the bin, overhead bins can be easily and economically increased from 100 yard to 150 yard storage capacity.

Contact Johnson today for New Concrete Plant Catalog.

THE C. S. JOHNSON COMPANY

KOEHRING SUBSIDIARY • CHAMPAIGN, ILLINOIS

2 TOURNAROCKERS

"These jobs will outpull anything I ever saw."

says RALPH PRICE of NICHOLAS DEVELOPMENT CO., INC.

STRIPPING approximately 750,000 yards of blasted rock and mixed earth for Babcock Coal and Coke at Babcock State Park, Nicholas Development Company, Inc., of Beckley, West Virginia, have found Tournarockers their most effective hauling equipment.

They have been using two of these revolutionary new LeTourneau 16-ton rock buggies for the past year to haul from a 2½-yard stripping shovel.

Average load every 4 minutes, 500' haul

Tournarockers are loaded with 6 passes from the well-heaped 2½-yard dipper . . . carry 14 bank yards. Checked on 500-foot, one-way haul, each rig averaged a round trip every four minutes including load, haul, dump and return. Road is average for strip-pit operation, slight favorable grade.

So fast was the haul cycle, that one of the two big-capacity Tournarockers was under the shovel at all times. Operation of the shovel was speeded up because big target area, measuring 11'2" x 7'10", plus the low body position of the Tournarocker, saved time each swing. Six dippers to a load also made for a faster shovel operation. There was also less spill than usual. The Tournarockers moved away from shovel faster than any equipment previously used by Hawkins and Price, owners of Nicholas Development Company, Inc. These haulers were off and away the instant the last pass was completed . . . took only seconds from a standing start to get rolling fast in 3rd gear.

Faster, cleaner on dump

On the dump, these versatile off-road hauling units also showed a lot of speed advantages. They backed into position quickly — saved time by eliminating usual turning and maneuvering. Because of front wheel drive and Tournarocker design, rear wheels could be backed onto the unstable fill edge, dump-

Send for Complete Facts

To: R. G. LeTOURNEAU, Inc., PEORIA, ILL. Please send information on E16 Tournarocker.

☐ Specifications ☐ Price ☐ Delivery ☐ Would like job analysis on present operations

NAME TITLE

COMPANY TYPE OF BUSINESS

STREET CITY, STATE

Would also like information on TOURNAPULLS: ☐ 7-yard "D" ☐ 13.3-yard "C" ☐ Big 30-yard "B"

speed coal stripping at West Virginia mine

ing the load over the bank . . . practically eliminating need for dozer work on the dump.

Powerful brakes with 4,108 square inches of braking surface . . . *more on one wheel than most haulers have on the whole vehicle* . . . made this kind of handling safe. Big tires and front-wheel drive made it easy to pull back on top. Push-button steer gave quick maneuvering, and instant gear selection got the Tournarockers under way at top speed fast. The vertical dump position and wide clean lines of the body, cleared loads fast; and even when wet, no material remained in bowl.

Cuts weather delays

Ralph Price, one of the owners, and in charge of stripping operation on Sewell Mountain, says that the Tournarockers have been a big help in maintaining practically continuous operation all summer and fall in spite of rainy weather that would normally close jobs with other type haulers. "They go through where others hang up," was the way he explained it.

You, too, can profitably cut your haul costs and increase your profits with Tournarockers . . . why not get an analysis from your LeTourneau Distributor . . . NOW!

Nicholas Development Co., Inc. like TOURNAROCKERS because:

1. **BIG TARGET** and low rear-entry for dipper gives fast loading.
2. **TOURNAMATIC DIFFERENTIAL** delivers more operating days during rainy weather.
3. **SHORT TURN RADIUS** permits close approach to bank, quick spot.
4. **LOADS DUMP CLEAR** . . . Tournarockers put rear wheels safely over bank . . . pull out easily with drive wheels always on the firm footing . . . most dump clean-up is eliminated.
5. **ELECTRIC STEER**, and safe, sure control at all times, eliminate severe operator fatigue common on other haulers.
6. **GIANT TIRES**, power-proportioning differential, and power steer, materially cut weather delays.
7. **4108 SQ. IN. BRAKE SURFACE** mean sure, safe stops, better control with bigger loads.

Tournapull-Trademark Reg. U. S. Pat. Off. Tournarocker-Trademark CM/0

LETOURNEAU TOURNAROCKERS

PEORIA, ILLINOIS

HIGH SPEED on RUBBER PLUS TRACTION ADVANTAGES of a CRAWLER

"Our FORD F-8 pulled a 25-ton shovel up 4th St. Hill!"

Roadside Report

FORD TRUCKS

W. A. WADSWORTH

DAYTON, OHIO

"RECENTLY we had occasion to place our 25-ton shovel at the top of East 4th Street Hill in Dayton," reports W. A. Wadsworth, General Manager of Southern Hills Pit, Inc. "We did this with our Ford F-8 Big Job without the assistance of a second truck and had a comfortable reserve of power. To our knowledge, no other make of truck has pulled the hill our F-8 did, with a similar load."

Owners and drivers sing the praises of the new Ford Big Jobs. *Owners* like Big Job extra power and low cost operation. They claim the new 145-horsepower engine outsaves engines much smaller in size. *Drivers* are enthusiastic about the ease and comfort of the Million Dollar Cab and its Ford Level Action suspension. *Both* are impressed by Ford Bonus Built construction, characteristic of 139-plus models in a full truck line. Bonus Built is the superstrong construction that contributes to long truck life.

ONLY THE FORD BIG JOB HAS ALL THESE FEATURES!

- ★ New 145-h.p. Ford V-8 engine for top performance.
- ★ Ford exclusive concentric dual-throat carburetor for more power, more economy.
- ★ New heavy duty 5-speed transmissions for operating flexibility.
- ★ Big Ford power-operated brakes for sure-footed stopping; rear 16-inch by 5-inch on the F-8.
- ★ Ford Super Quadrax 2-speed axle with vacuum shift for performance flexibility in Model F-8 (single speed axle also available); single-speed Quadrax Hypoid Axle in Model F-7.
- ★ Large diameter (10-inch) wheel bolt circle with 8 studs to allow for extra-strong hub construction.
- ★ Million Dollar Cab with Ford Level Action suspension for greater driving comfort.
- ★ Nationwide service from over 6,400 Ford Dealers.
- ★ Ford Bonus Built construction for long truck life.

Gross Vehicle Weight Ratings: F-8 up to 21,500 lbs., F-7 up to 19,000 lbs. Gross combination ratings: F-8 up to 39,000 lbs., F-7 up to 35,000 lbs.

FORD 1949 Bonus Built TRUCKS 1949

BUILT STRONGER TO LAST LONGER

USING REGISTRATION DATA ON 5,444,000 TRUCKS, LIFE INSURANCE EXPERTS PROVE FORD TRUCKS LAST LONGER!

"No Upkeep Now"

BELT SLIP ELIMINATED, BEARING DAMAGE STOPPED, POWER WASTE ENDED WHEN *TEXROPE* V-BELT DRIVE REPLACES FLAT BELT.

CHIEF PLANT ENGINEER in this midwest plant says, "The old flat belt on this blower drive was twelve inches wide on twenty foot centers. Not only was it heavy but it also absorbed a lot of power.

"Besides that, dust made the belt slip constantly. We had to keep the belt so tight that it ruined bearings. And slipping would burn the belt. Maintenance on our old flat belt drive cost us hundreds of dollars every year.

"Four years ago an Allis-Chalmers representative recommended this *Texrope* drive. It doesn't slip at all, doesn't hurt the bearings and we haven't spent a cent on it. I wish we had changed to a *Texrope* drive years sooner."

Money-saving performance like this is one of the reasons why more *Texrope* industrial V-belt drives have been installed since 1926 — when Allis-Chalmers originated the multiple V-belt drive — than any other kind.

The *Texrope* line gives you practically everything you need for any V-belt drive . . . V-belts, standard and *Vari-Pitch* sheaves and speed changers . . . all from one reliable source. You can engineer 90% of all V-belt drives yourself with the help of the *Texrope* Pre-engineered Drive Manual. See your A-C Authorized Dealer or District Office or write for Bulletin 20B6956. Also in Sweet's.

Texrope Super-7 V-belts result from the cooperative research of Allis-Chalmers and B. F. Goodrich; and are sold only by A-C dealers and offices. *Texrope* and *Vari-Pitch* are Allis-Chalmers trademarks. A 2648

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and District Offices throughout the country.

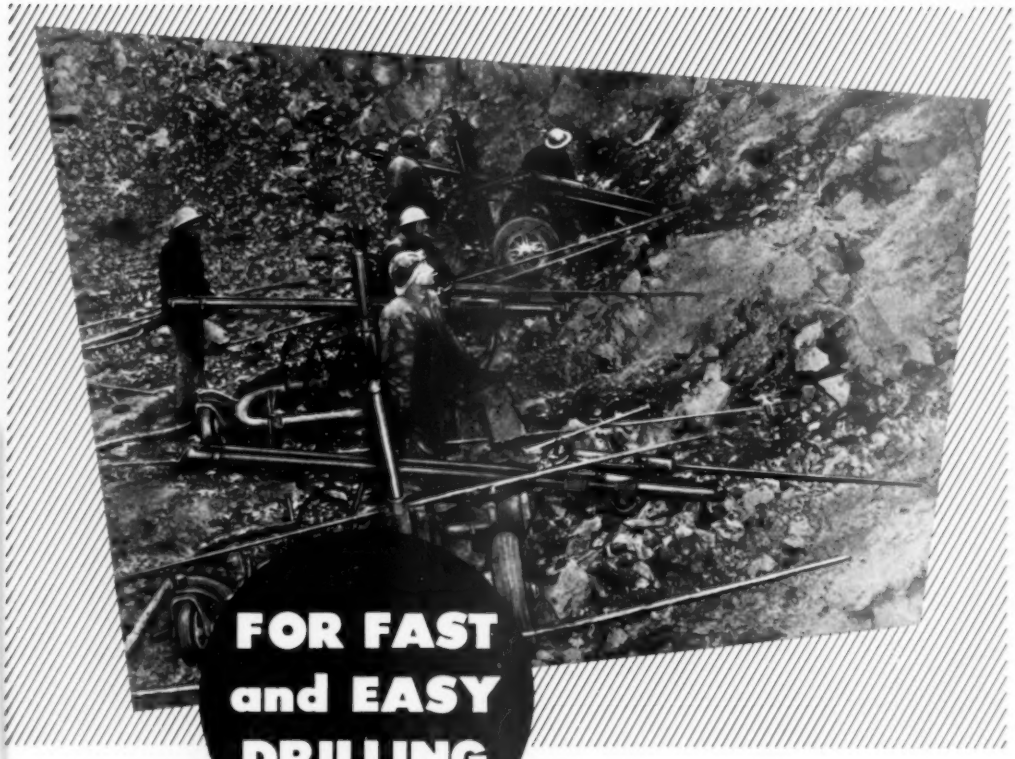
MOTORS — ½ to 25,000 HP and up. Matching Allis-Chalmers Control.

TEXROPE — Belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.

PUMPS — Integral motor and coupled types. Sizes and ratings to 2500 GPM.

ALLIS-CHALMERS, 975A SO. 70 ST.
MILWAUKEE, WIS.

ALLIS-CHALMERS



FOR FAST and EASY DRILLING

Providing fast and easy operation of the more powerful CP drifter drills, the lightweight G-200R WAGON DRILL greatly reduces drilling costs.

It will drill holes at any angle, and the sliding cone, with a 36-inch adjustment, offsets ground irregularities or uneven steel lengths. Its CP rotary air motor gives a steady feed and quick return, with ample power for pulling tight steel.

Because of the flexibility of its mounting, the Wagon Drill can be quickly adjusted for toe-hole drilling or bench drilling. For line drilling, or drilling close to the face, the carriage wheels can be turned at right angles.

Its three roller-bearing wheels, equipped with pneumatic tires, insure ease of movement however rough the ground. The main frame, uprights and mounting are of seamless steel tubing, providing maximum strength per pound of weight.

Write for complete information.

The G-200R WAGON DRILL is available with CP-50N (3"), CP-60N (3½"), or CP-70 (4") Drifters.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

★★★★ Barber-Greene ★★★★

B-G COST SAVING BULLETIN No. 4902

CONTRACTOR LOADS 80,000 YARDS PER YEAR WITH ONE BUCKET LOADER

Reports Loading Cost of 1/2 Cent per Yard

Ashland, Mass. — Backed by years of experience with all types of truck-loading equipment, and close cost accounting on each type, the Ashland Sand and Gravel Company, Inc. reports that the record for lowest cost and fastest truck loading goes to its B-G 545-A Bucket Loader.

In loading approximately 80,000 yards of material yearly—sand, stone, loam, etc., the B-G Loader brought costs down to one-half cent per yard, including depreciation and maintenance as well as operating expense. This low cost also includes the time involved in moving from stock pile to stock pile—and would of course be even lower if the Loader worked from only one stock pile. In reporting these facts, A. N. Leverone, the company's president, further adds, "In our opinion the principle of the continuous flow of material as incorporated into your Bucket Loader guarantees high capacity loading at a steady uniform rate with a minimum of maintenance and operating expense."

Broad Range of Users Cuts Costs with Heavy-Duty B-G Loaders

Modern Controls Aid Operators Conveniently banked controls help make any man an expert operator quickly. Hydraulic boom hoist is power operated. Hydraulic brakes on main drive wheels.

Boom Cradles For fast transport, boom quickly lowers to horizontal position to give low clearance. Two travel speeds—turning diameter is 31 feet.

Builders, general contractors, state and highway departments, material dealers, aggregate producers, black dirt contractors—all report new low costs in truck loading with the B-G 545-A Loader. This heavy-duty, 3 cubic yards per minute Barber-Greene provides high capacity loading of all free-flowing materials such as stone, gravel, sand, cinders, coal, coke, top soil, fertilizer, etc. Mounted on tractor-type pneumatic tires with automotive steering, the 545-A combines mobility and maneuverability with compactness. It gets around quickly in cramped areas and can be readied in a few minutes for moving from one location to another. With its Spiral Feed and welded steel buckets, the 545-A loads clean—has the ability to dig into bank top soil or shoulder. Completely modern in design the 545-A has centralized operating controls, floating boom, automatic overload release, self-locking adjustable swivel spout, heavy-duty battery, electric starter and other advanced features.

Loader Pays on 4,000 Tons Per Year

"Gives Us More Trucks," says Firm Head

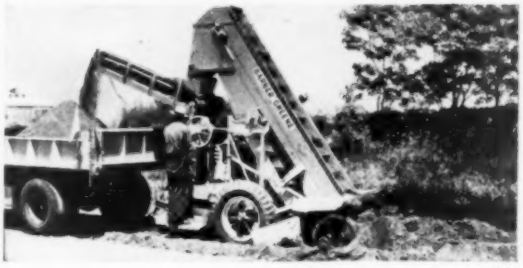
Lake Forest, Ill. — Two years of loading aggregate with a B-G Bucket Loader persuaded the G. L. Blanchard Company to purchase a duplicate machine for loading their stoker coal—although their yearly volume is only 4,000 tons. Now in its second year of service, the additional B-G Loader has proved to be an excellent investment.

E. G. Lindenmeyer, president, reports, "the savings in the loading operation itself are only part of the story. Our real saving is in truck time. During our rush season the machine is invaluable and, in effect, **it gives us more trucks.**"

So far, the G. L. Blanchard Company has handled 39,000 tons of lime, stones, sand and gravel with their first Barber-Greene, and to date their repairs for both machines have totaled zero.

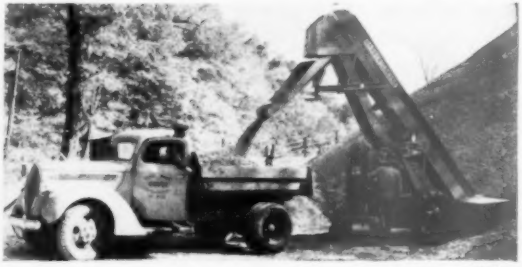
PRTD IN U. S. A.—220,000 M 4-49 AM

USERS REPORT BROADEST RANGE OF JOBS HANDLED BY VERSATILE BUCKET LOADERS



A621-B

For low clearance and long reach the B-G 522 Loader is equipped with swivel discharge conveyor which has a swing of 140°. Ready for truck towing at 20 m.p.h. with no adjustments. Loader easily converted to Snow Loader.

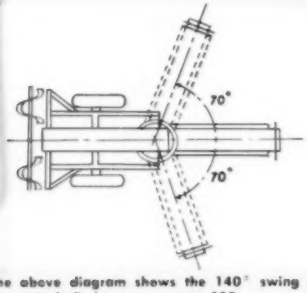


The 522 is also available with high boom and swivel spout. If low clearance is not necessary, this model is often chosen as it is lower in initial cost and provides the same capacity, portability and other performance features. The high boom type can be equipped with vibrating screen for scalping oversize.

SAN FRANCISCO FINDS MULTIPLE USES FOR BUCKET LOADER . . . VARIETY OF COST-REDUCING PERFORMANCES REPORTED

San Francisco, Cal.—When the Park Commission here bought an 82-A Loader with gravity screen, it was for one purpose: namely, beach cleaning. This was the job they had in mind, for the 82-A has gained quite a reputation for removing glass, nails, and other dangerous rubbish from city beaches. It wasn't long, however, before the broader usefulness of the 82-A was discovered. Now it's used for clearing away sand accumulations in the dividing strips on the highway, stripping loam, excavating for park paths, and regular truck loading, along with its beach-cleaning duties.

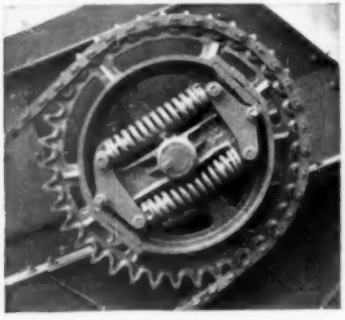
Milwaukee, Wis.—Elmer Engler Company, landscape gardener here, has been using Bucket Loaders for stripping top soil for the past ten years. Their latest Loader, an 82-A, was delivered in 1947, and since then has loaded and screened thousands of yards of clean top soil—300 to 400 yards per day—stripping from field or stock pile. Even in stripping operations they report a 5-yard truck is loaded in 4 minutes, and the high discharge of the 82-A facilitates stock-piling without the use of any additional equipment.



The above diagram shows the 140° swing of the swivel discharge conveyor 522.

Automatic Overload Release Saves Time and Maintenance—All B-G Loaders are equipped with an automatic overload release mounted on the bucket loader head shaft. It automatically trips on overload and automatically resets itself.

A615D



Hollywood, Cal.—To provide safety for participants in the "Sport of Kings" the Hollywood Turf Club and other Coast tracks use an 82-A Loader with special screen attachment to keep the turf free of pebbles which might cause injury to horses.

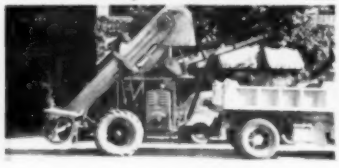
B-G LOADERS GET THERE FAST—MANEUVER EASILY

The Model 522 B-G Loader combines convenience, capacity and adaptability with a low initial investment and extremely low operating cost. It handles the broadest range of free-flowing bulk materials—as much as 1½ cubic yards per minute—and, as such, is a widely used machine among highway maintenance departments, contractors and municipalities. It is frequently used for leveling, landscaping and other similar operations.

The Swivel Conveyor Model 522 is designed to be low enough to avoid tree branches in street or road work—and to work inside warehouses or other locations where obstructions would ordinarily interfere. On its pneumatic tires, the 522 is towed behind trucks at normal speeds.

20 m. p. h. TOWING

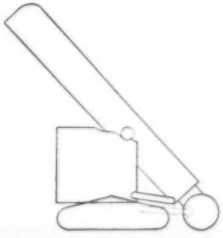
1410X15



B-G FLOATING BOOM ADJUSTS ITSELF TO GRADES AUTOMATICALLY

Assures Accurate Cleanup

The B-G Floating Boom provides for scraper thrusts to be exerted through push-arms direct from the crawlers. The boom is supported on rollers which allow it to automatically adjust itself to irregularities in the grade. This, combined with the follow-up scraper, makes possible a nice cleanup and digging to grade with a high degree of accuracy. Preliminary grades may easily be obtained—in the case of highway operations, for instance.



Floating boom design identifies all Barber-Greene's.

A Feature of All B-G Loaders

The patented Floating Boom is only one of many features in common with all B-G Loaders. Others include the automatic overload release, the B-G Synchronized Spiral Feed, truck type transmissions, simplified controls, etc.

LOADER HELPS DRY FERTILIZER

Morocco, French Africa—A large phosphate mine here uses a B-G 522 in an interesting aerating operation. Traveling down long windrows of phosphate, the 522 elevates the material and, in depositing it in neat, easily reclaimed piles, hastens the drying process.

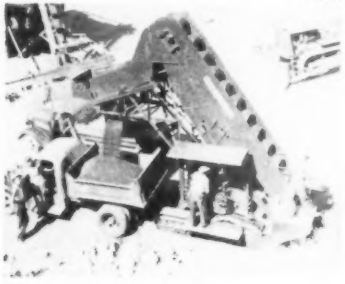
125,000 TONS LOADED IN TWO YEARS TOTAL REPAIRS LESS THAN $75.00

Aggregate Firm Tells Record of B-G Loader

Milwaukee, Wis.—H. F. Reinkel of the Lake Shore Stone Company claims he has the best stock pile loading unit on the market today in his B-G 82-A Loader—and backs his claim with impressive figures:

In the past two years, this Loader has handled 125,000 tons of sand—yet repair costs have been less than $75.00. In an 8-hour day, up to 710 tons are loaded by this crawler-mounted Barber-Greene. Operating the year around, the 82-A successfully breaks through frozen sand, and with its Spiral Feed, pulverizes it to make possible high capacity loading under rigorous conditions.

Mr. Reinkel sums up with the information that with his 82-A, he can exceed the loading capacity of much costlier and less versatile equipment.



Loaders Pay Off at Bottom of River

Reno, Nev.—Down in the dry river bottoms near here, three B-G Loaders are efficiently at work reclaiming, screening and loading aggregates for the State of Nevada. Equipped with double-deck vibrating screens, the Loaders are able to segregate aggregates into the sizes required—making reclaiming, loading and screening a simple, simultaneous operation. Crawler-mounted, the 82-A's have the stability required for working in locations such as this.

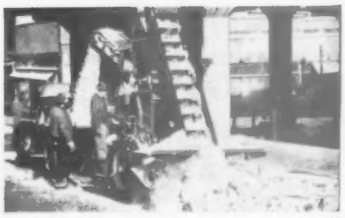
Crawler Mounting Often a Must

The full crawler mounting of the 82-A helps make possible its record performance wherever soft or unsure footing is encountered and or where maximum traction is desirable. This versatile, heavy-duty loader handles 2½ to 3 cubic yards per minute, is available with a wide variety of accessories such as gravity screens, bar screens, vibrating screens, etc. It is widely used as a component of the Barber-Greene Travel Plant where it tows the Mixer and loads it from windrowed material.

ROAD CONTRACTOR AVERAGES 1,000 TONS PER LOADER, PER DAY

Mechanicville, N. Y.—There's a 93,000 ton hole in the ground near here where two 82-A Loaders excavated, screened and loaded bank run gravel for a State road project.

Collins Brothers, Road Contractors, put the Barber-Greene's to work after turning down other types of excavating and loading equipment as too expensive and too slow. The gravel deposit was found in a flat meadow and after scrapers had removed the overburden, the 82-A's took over the job on their own. They each excavated and loaded up to 1,000 tons per day, leaving a 25-foot hole covering many acres—plus a remarkable record for getting a big job done at minimum cost per ton.



Mechanicville, N. Y.—Regular summer service as a Bucket Loader, plus additional value in winter as a Snow Loader, wasn't enough for this 522. Commissioner of Public Works now reports it's used to help keep the 21 miles of city streets free of leaves during the fall.

CITIES CONVERT BUCKET LOADERS TO SNOW LOADERS FOR YEAR-ROUND SERVICE

Removes 6-inch Fall in 18 Hours

Hagerstown, Md.—The first time this city's newly acquired 522 Snow Loader was put to work on snow removal, it removed 6 inches of snow from 3 miles of streets in less than 18 hours. According to J. A. Abbott, Jr., Superintendent of Streets, the 522's performance far exceeded that of other loaders used in the past. It was especially impressive in view of the fact that this was the first time it had ever been used, and also sufficient trucks were not available to keep it operating continuously. Mr. Abbott states, "I personally feel that the 522 Barber-Greene is the answer to the snow removal problem. It is economically priced for use in small towns and several could be used to solve the same problem in larger towns."

Helps Immensely on Snow Removal

Johnston, N. Y.—At negligible cost, this town has converted its 522 Bucket Loader into a Snow Loader capable of handling up to 5 cubic yards of snow a minute. Mr. A. H. McCaffrey, city engineer, affirms that the economies of snow removal are well appreciated by city officials and that the Model 522, with the aid of a few trucks, eliminates congestion and slowup of traffic caused by snow, especially in the business section.

Added incentive to use the 522 to clear streets fast in many cities is maintenance of parking meter revenue—a valuable source of income that suffers when streets are clogged with snow.

Removes 20 Yards of Snow Per Minute

For snow removal on a large scale the 548-A Loader offers the impressive capacity of up to 20 cubic yards per minute. Pneumatic-tired, with 4-wheel drive, it travels at 7 miles per hour road speed. Swivel conveyor allows trucks to travel in the same direction as the Loader. And the 548-A is convertible to a Bucket Loader.

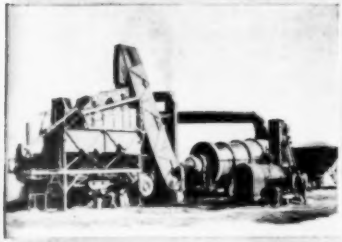
THE B-G LINE CUTS COSTS ALL ALONG THE LINE...

See Barber-Greene for:

B-G PORTABLE CONVEYORS: For moving all bulk materials and packaged goods. Variety of lengths, belt widths and capacities. Electric or gasoline power.

B-G DITCHERS: Crawler and pneumatic tire mounted, for digging trenches from 3½" wide, 4' deep to 24" wide, 8' 3" deep.

B-G PERMANENT CONVEYORS: Complete, standardized equipment including carriers, take-ups, drives, frames, etc.



B-G BITUMINOUS PLANTS: Highly portable plants for producing all types of mixes—up to 120 T.P.H.

B-G FINISHERS: Automatically place smooth level surface regardless of variations in subgrade.

B-G COAL YARD EQUIPMENT: Belt and chain-and-flight Portable Conveyors; self-propelled, pneumatic-tired. Also, hopper-car Unloaders.

To Help You Cut Corners . . .

Barber-Greene Experience is at Your Service

Cutting costs these days is of major importance to everyone whose business involves the handling and rehandling of bulk materials. And it's a subject in which Barber-Greene representatives are well versed and widely schooled—in which their advice may prove invaluable to you. If you're attempting to cut costs by eliminating the use of expensive equipment and manpower, see your Barber-Greene distributor or write directly to Aurora, Illinois. You may be sure your problem will gain quick and helpful consideration.

Barber-Greene Company
Aurora, Illinois
Cable address "Bargreene"

Send information on the Barber-Greene's checked below as indicated:

- ☐ 545-A Loader
- ☐ 522 Loader
- ☐ 82-A Loader
- ☐ 522 Snow Loader
- ☐ 548-A Snow Loader
- ☐ _____
  Other B-G Equipment
- ☐ Have a Representative Call

Name _____

Company _____

Position _____

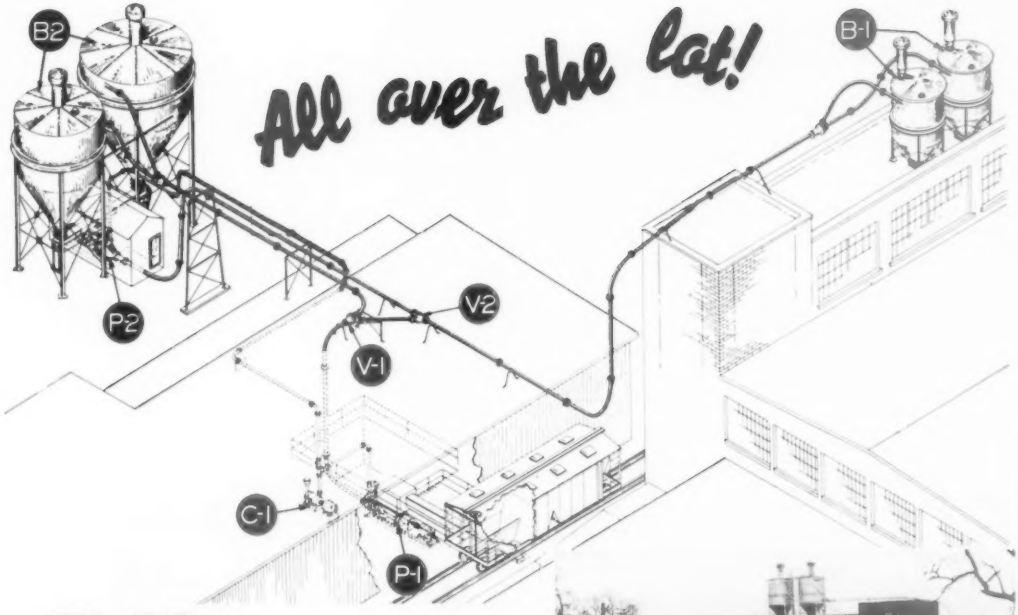
City _____ Zone _____ State _____

Before You Bid . . .
Before You Buy . . .
Send This Coupon!

Don't overlook any opportunities these days to widen your margin of profit! In the Barber-Greene line there are many machines—many opportunities—for efficient application to help you bid successfully, to help you operate your business more efficiently.

Fill in and send this coupon to get full, prompt information on the Barber-Greene equipment which interests you. Or see your Barber-Greene distributor.

BARBER-GREENE COMPANY
Aurora, Illinois



F-K SYSTEMS

DOING AN EFFICIENT MATERIAL-HANDLING JOB

The Fuller-Kinyon Systems, illustrated by the drawing above, are used for unloading, conveying and reclaiming Portland cement and filler dust in an asbestos shingle plant. Installed in an existing plant, these systems were designed and built to service process equipment already installed, and provide for future expansion.

"All over the lot" conveying, that's virtually what happens to the materials handled by the Fuller-Kinyon Systems in this plant. Through the simplicity and flexibility of these systems, materials are unloaded (P-1), from hopper-bottom cars to a Fuller-Kinyon Pump, and conveyed, through the use of two-way diverting valves (V-1 and V-2), direct to process bins (B-1), or to reserve storage bins (B-2). A second Pump (P-2), conveys materials from the storage bins (B-2), to process bins (B-1). A very flexible and simple system, economically possible only with Fuller-Kinyon.

A Fuller Rotary Single-stage Compressor (C-1), furnishes air for both conveying systems, capacity 282 c.f.m., 25-lb. pressure. Air, where and when needed, and at the right pressure to do the work most economically and efficiently.

FULLER COMPANY, CATASAUQUA, PA.

CHICAGO 3 - 120 SO. LASALLE ST.

SAN FRANCISCO 4 - 420 CHANCERY BLDG.

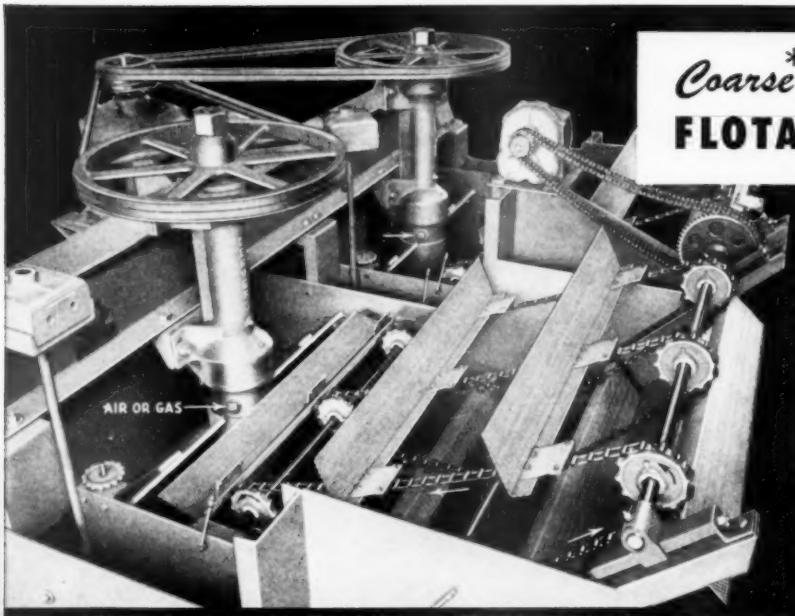
WE BUILD

FULLER-KINYON CONVEYING SYSTEMS
F-H AIRSLIDE CONVEYOR
FULLER-FLUXO CONVEYING SYSTEM
THE AIRVEYOR
ROTARY COMPRESSORS AND VACUUM PUMPS
INCLINED-GRATE COOLERS
DRY PULVERIZED-MATERIAL COOLER
ROTARY FEEDERS AND ROTARY VALVES
MATERIAL-LEVEL INDICATORS
MOTION SAFETY SWITCH
AERATION UNITS
SLURRY VALVES
SAMPLERS

P-103

Fuller

ENGINEERS AND BUILDERS OF MATERIAL-HANDLING SYSTEMS



Coarse* COAL FLOTATION

Working directly with the Bureau of Mines Coal Preparation Section, and with large coal companies engaged in solving the problem, Denver Flotation Engineers designed a Flotation Machine which does an effective job of coal cleaning as will be noted in the tabulations below from Bureau of Mines Report of Investigations 4306, July 1948.

Marketable results are obtained on varying types, grades and sizes of coal fractions.

with DENVER "SUB-A" FLOTATION MACHINES

PROBLEM • Treating coal fractions from 1/16"-0. Two objectives are sought—

1) *to save marketable grade of coal in these sizes and*

2) *eliminate stream pollution from wasted slurry water.*

These coal fractions cannot be satisfactorily cleaned by "gravity" methods. With flotation remaining as the most acceptable solution, a prime consideration is that the flotation machine used must be capable of handling both coarse and fine sizes effectively. The rapid rising, dense agglomerate type "matte" coal concentrate must be removed and dewatered in large volume.

SOLUTION • No commercial flotation machine can treat both coarse and fine sizes so effectively as the Denver "Sub-A." This selective feature plus its extreme mechanical and metallurgical flexibility makes it the logical choice for coal cleaning work.

Removal and dewatering of the dense agglomerated "matte" concentrate was accomplished with special "deep-digging" punched plate rakes which carry the 7"-8" coal matte up the spitzkasten allowing surplus water to drain back in the pulp through the perforated rakes. Further dewatering is carried out in a wedge bar compression screw conveyor. Surplus water returns via middling feed pipe to the Denver "Sub-A" Flotation cell for re-use, thus eliminating surplus slurry water.

	SCREEN SIZE, MESH	FEED		CLEANED COAL		REFUSE		DISTRIBUTION, %		Reagents, lbs. per ton feed
		Weight, percent	Ash, 1* percent	Weight, percent	Ash, 1* percent	Weight, percent	Ash, 1* percent	Cleaned Coal	Refuse	
MINE I *	10 to 14	18.8	11.9	23.0	6.2	9.1	31.6	77.6	22.4	Kerosene, 3.27
	14 to 35	51.4	19.1	56.0	7.6	31.9	65.3	80.1	19.9	B-23 Frother, 0.24
	35 to 100	23.3	40.3	17.0	13.4	35.6	81.8	60.7	39.3	Pine Oil, 0.11
	Through 100	6.5	58.3	4.0	19.3	23.4	84.0	39.7	60.3	
	Composite through 10	100.0	25.2	100.0	8.7	100.0	72.5	74.1	25.9	
MINE II *	10 to 35	64.2	10.5	58.2	3.4	54.0	50.7	85.0	15.0	Kerosene, 3.46
	35 to 100	22.6	10.5	26.9	4.6	22.2	66.2	90.4	9.6	B-23 Frother, 0.26
	Through 100	13.2	12.8	14.9	6.3	23.8	64.8	88.9	11.1	Pine Oil, 0.20
	Composite through 10	100.0	10.8	100.0	4.2	100.0	57.5	87.6	12.4	

1*—Moisture free basis

CONSULT WITH YOUR DENVER "FLOTATION ENGINEERS"

"The firm that makes its friends happier, healthier and wealthier"

DENVER EQUIPMENT COMPANY
24 HOUR SERVICE

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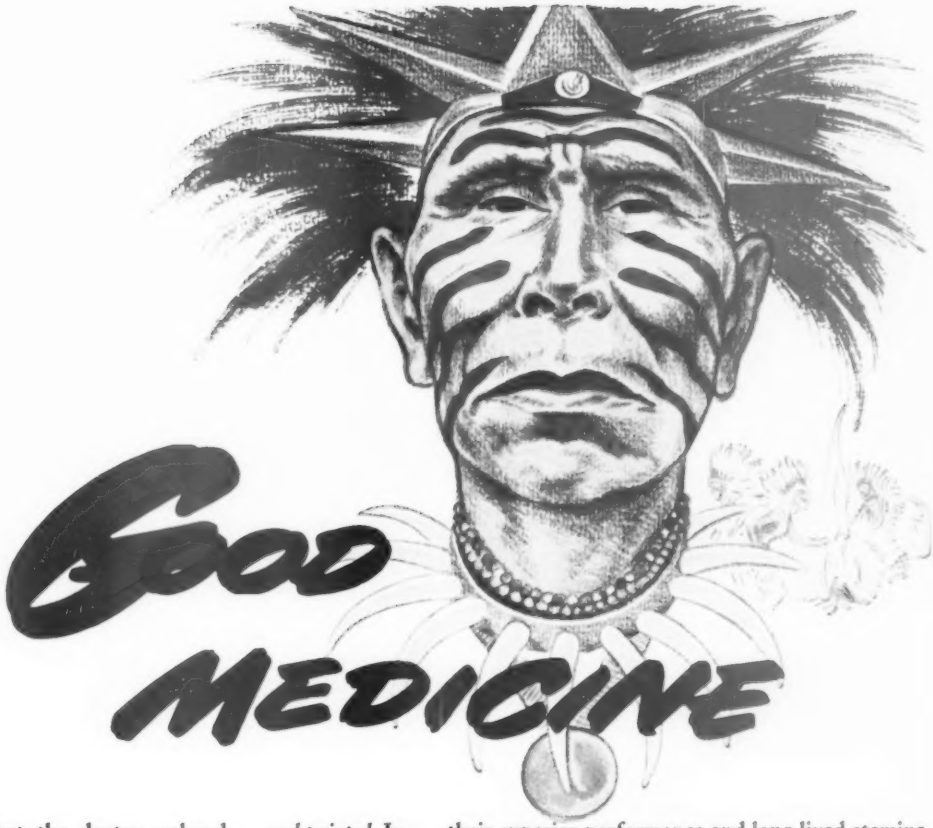
P. O. BOX 5268 • DENVER 17, COLORADO

DENVER • NEW YORK CITY • CHICAGO • TORONTO • VANCOUVER • MEXICO CITY • LONDON • JOHANNESBURG • RICHMOND, AUSTRALIA



GOOD MEDICINE

Just what the doctor ordered . . . *red-painted* International Diesels keep balance sheets healthy by boosting production and guarding costs. They deliver their full-rated horsepower on every job, yet hold in reserve additional lugging ability for handling sudden overloads that would otherwise kill. • Their starting and combustion systems, fuel feed, speed governing, torque control, lubricating methods and overall rugged construction account for their superior performance and long-lived stamina. • Since reliable, economical power is "good medicine" for any power-using business, it will pay you to contact your International Power Unit Dealer and get International Diesels on your operations now.

INTERNATIONAL HARVESTER COMPANY • Chicago

Three International UD-18 Diesel Power Units, teamed together to operate the secondary crusher of this agricultural limestone plant, present a picture of power that assures long-lived, dependable and profitable production.

Listen to James Melton and "Harvest of Stars" every Sunday, NBC.

CRAWLER TRACTORS
WHEEL TRACTORS
DIESEL ENGINES
POWER UNITS

INTERNATIONAL HARVESTER

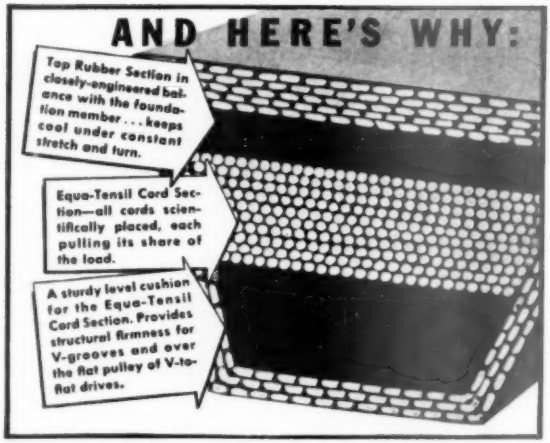
INTERNATIONAL
INDUSTRIAL POWER

PLENTY PULL GREAT SHOCK-RESISTANCE

Every cord in U. S. Rainbow Multiple V-Belts pulls its own share of the load, absorbs shocks smoothly and exerts great tensile strength under heavy burdens.

These cords all work together because they are concentrated in a single scientifically-designed unit known as the "EQUA-TENSIL CORD SECTION." Even more pulling power is gained by means of straight sidewalls, which grip the grooves for complete contact the full height of the belt. Protective jackets increase the grip while keeping out dirt and prolonging wear.

Rainbow V-Belts are interchangeable with all other standard makes. Lengths are matched for multiple use. Available through U. S. Rubber equipment distributors in the nation's principal trading centers. For more information write to Mechanical Goods Division, United States Rubber Company, Rockefeller Center, New York 20, N. Y.


AND HERE'S WHY:
Top Rubber Section in closely-engineered balance with the foundation member . . . keeps cool under constant stretch and turn.
Equa-Tensil Cord Section—all cords scientifically placed, each pulling its share of the load.
A sturdy level cushion for the Equa-Tensil Cord Section. Provides structural firmness for V-grooves and over the flat pulley of V-to-flat drives.

U.S. RAINBOW V-BELTS

WITH EQUA-TENSIL CORD SECTION

A PRODUCT OF

U.S. RUBBER

SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

The Porter Brothers' crushing operation at Roscoe, Illinois, is 100% "Caterpillar" powered, with a D13000 in the shovel, two D17000s on the crusher, and a D8800 Electric Set furnishing power for conveyors.

"Caterpillar" powered FROM START TO FINISH

EVERY STEP of this crushing operation is powered by "Caterpillar" Diesels, and Mr. F. M. Porter of Porter Brothers, Roscoe, Illinois, tells why in no uncertain terms:

"We favor 'Caterpillar' Engines over any other make. Our 'Caterpillar' power is more dependable."

Dependable—that's the word for husky "Caterpillar" Diesels. Day in and day out you can count on them for reliable, low-cost performance—the kind of performance they deliver in this operation. The Link-Belt Speeder Shovel is equipped with a D13000 Engine. Two D17000s run the Dixie 36-40 crusher, while a D8800 Electric Set furnishes power for three conveyors. Average output: 100 tons of agricultural and road lime per hour.

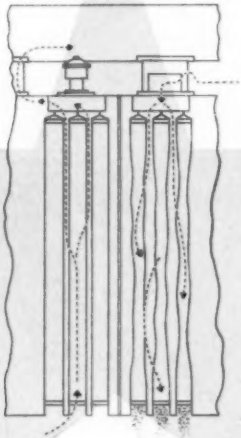
For money-saving, trouble-free, efficient power—the power that meets your needs—see your "Caterpillar" dealer today. He has the right answers, and he can make delivery on both Engines and Electric Sets.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

CATERPILLAR
REG. U. S. PAT. OFF.
DIESEL
ENGINES • TRACTORS
MOTOR GRADERS
EARTHMOVING EQUIPMENT

★

1. With 78 cylindrical bags per compartment all the cloth area of each bag is in active use and bags are kept fully distended by air moving upward inside the bags.



★

3. Shaking and cleaning involves only one compartment at a time. During this short period the vigorous reciprocating shaking and reversed air flow insures cleaning of bags.

★

2. Variable timing of cleaning cycle according to dust load insures constant volume of air handled, and of dust collected per square foot of cloth between cleaning cycles.

★

4. Any compartment may be cut out of operation as long as desired for bag repair, on the clean air side, and all other compartments will remain in operation.

Automatic Bag Type ...Star of Norblo Dust Collection Systems

Shows How Natural Principles Are Best Applied In Dust Collection For Efficient . . . Low Cost . . . Continuous Duty

CONTINUOUS operation at full rated capacity is the reason for the many installations of Norblo automatic bag type equipment in the zinc and lead smelting, the cement and rock products, the chemical and the milling industries.

Rugged construction, basic unit compartment and few moving parts combined in a fully functional coordinated design insure very high efficiency and very low cost of operation and maintenance.

A most important advantage of this equipment is its adjustment for varying dust loading, which can be made in a few minutes without shutting down the installation.

Let us send you Norblo Bulletin 162-4 describing in detail and giving dimensions and capacities of heavy-duty automatic bag type equipment.

The Northern Blower Company

Automatic and Standard Bag Type Fume and Dust Collectors, Norblo Centrifugal and Hydraulic Collectors, Exhaust Fans

6408 Barberton Avenue • Cleveland 2, Ohio

Cuts Pump Upkeep

COST DOWN MORE THAN HALF IN 4 YEARS SERVICE AT MICH. CITY PLANT

SAYS A. C. LOHSE, General Power Engineer, Pullman-Standard Car Manufacturing Company — "Maintenance costs on our old pump were sky-high, so in March, 1945, we installed this *Electrifugal* pump to move condensate from our compressors and hydraulic pumps. It has run 16 hours a day, five days a week with only routine maintenance and one repacking. Cost per gallon is less than half what it was and performance is much more dependable."

This is the kind of dependable, cost-lowering service you can get from *Electrifugal* pumps. Motor and pump are mounted on *one* shaft in *one solid frame* for maximum rigidity. Feet are wide spread for firm support. Bronze ring protects casing from wear by impeller and is easily replaced when required.

Every *Electrifugal* pump is tested at the factory. Performance is guaranteed.

Allis-Chalmers makes hundreds of pumps for many types of service. For full information, see your A-C Authorized Dealer or District Office, or write for Bulletin 52B6059E. Also in Sweet's. A 2640

ALLIS-CHALMERS, 975A SO. 70 ST. MILWAUKEE, WIS.

Electrifugal, *Texrope* and *Vari-Pitch* are Allis-Chalmers trademarks.

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Sold . . .
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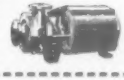
by Allis-Chalmers Authorized Dealers, Certified Service Shops and District Offices throughout the country.

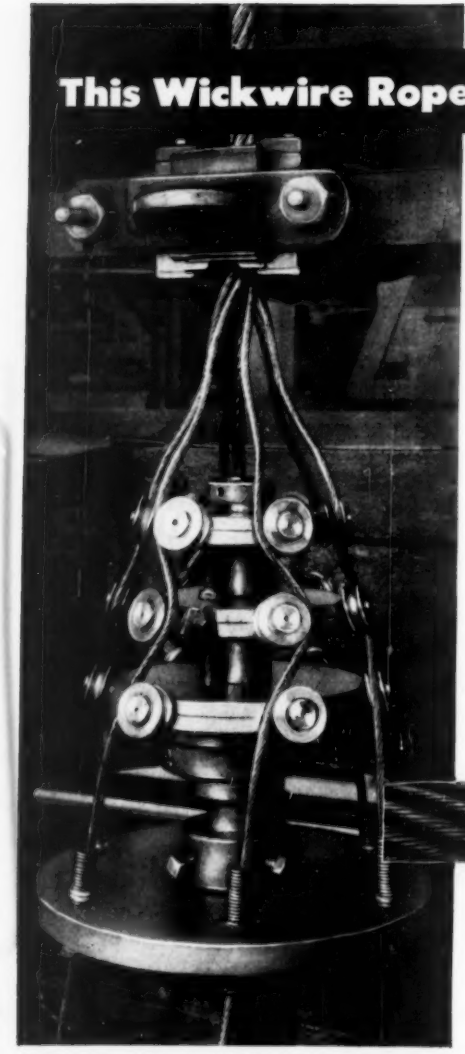
MOTORS — ½ to 25,000 HP and up. Matching Allis-Chalmers Control.

TEXROPE — Belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.



PUMPS — Integral motor and coupled types. Sizes and ratings to 2500 GPM.

This Wickwire Rope Gets a Permanent Wave

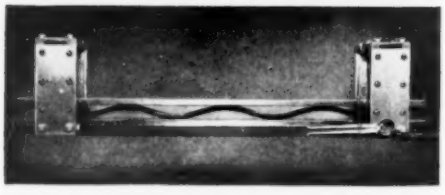


Passing strands of Wickwire Rope through a special roller head causes them to set in a wave-like pattern. The result is WISSCOLAY *Pre*formed—a rope that not only lasts longer than non-preformed rope, but is kink-resistant; easier to cut, splice and install, and safer to handle.

Before any order of WISSCOLAY *Pre*formed is run off, samples are subjected to several tests—most important of which is the Strand Helix Test. Individual strands are placed between the plates of the testing apparatus and checked with a micrometer. These tests are made by inspectors whose approval demands that the helix diameter be controlled within the closest of tolerances in meeting the specified standard.

This and countless other tough tests, coupled with over 125 years of wire-working know-how, make Wickwire Rope the logical choice of rope users who demand the utmost in performance, safety and long life.

Wickwire Distributors and Wire Rope Engineers in key cities everywhere are ready to help solve your wire rope problems and to provide prompt delivery of the rope you need. Wickwire Rope is available in all sizes and constructions—both regular lay and WISSCOLAY *Pre*formed.



THIS 82-PAGE BOOK ON WIRE ROPE IS FREE. WRITE FOR YOUR COPY TODAY!

Thousands of wire rope users have found that the information packed in the pages of "Know Your Ropes" has made their work easier. It's full of suggestions on proper selection, application and usage of wire rope. It's easy-to-read and profusely illustrated. For your free copy, write—Wire Rope Sales Office, Wickwire Spencer Steel, Palmer, Massachusetts.

WICKWIRE ROPE

CF&I SUBSIDIARIES

A PRODUCT OF THE WICKWIRE SPENCER STEEL DIVISION OF THE COLORADO FUEL AND IRON CORPORATION

WIRE ROPE SALES OFFICE AND PLANT—Palmer, Mass. **EXECUTIVE OFFICE**—500 Fifth Avenue, New York 18, N. Y.

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PACIFIC COAST SUBSIDIARY—The California Wire Cloth Corporation, Oakland 6, California

Why are more and more large operators reordering P&H Electric Shovels? The reason is clear — lower operating costs. They've piled up the proof with Added Values like these:

1. "*Magnetorque*"* *Drive*— hoists the dipper with electro-magnetic power — lowers with less than half the usual inertia to overcome. It's faster.
2. "*Magnetron*" *Control*—entirely eliminates control fingers and contactors. It's simpler, more dependable.
3. *Independent Propel*—eliminates sliding gears, brakes, clutches and their controls — provides faster move-up.
4. *Air-filtered cab*—pressurized to allow only clean, fresh air to enter — no dust to damage electrical equipment.

Yes, proof on the job makes P&H the choice of discriminating buyers — leads to one repeat order after another. Investigate before you invest.

* T. M. of the Harnischfeger Corporation for Electro-Magnetic Type Clutch

ELECTRIC SHOVELS
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EXCAVATORS · ELECTRIC CRANES · ARC WELDERS · P&H · HOISTS · WELDING ELECTRODES · MOTORS

Every third P&H Electric Shovel sold is a repeat order

LEADING THE FIELD IN ELECTRIC SHOVEL DEVELOPMENT

Rock-Crushing POWER AT ROCK-BOTTOM COST

Ada County's Universal No. 880 Master gravel plant with 24" twin dual roll crusher and No. 1024 jaw crusher, powered with a 6-71 GM Diesel engine.

Here's a rock-crushing plant that produces up to 200 three-yard truck loads a day using only 45 gallons of fuel in 8 hours. It's owned by Ada County, Idaho, and it is powered with a 6-cylinder General Motors Series 71 Diesel.

In applications like this, all over the country, these rugged 2-cycle GM Diesels are getting more work done—and getting it done for less cost. With power at every downstroke, they deliver a sturdy, dependable flow of power. They're smooth, easy to start and quick to adjust to varying load demands.

As for upkeep—it is always low because of the clean, simple design and precision manufacture found in GM Diesel engines. They are built to "take it" on tough jobs like this—are given rigid "run-in" tests. Then too, they are backed by Detroit Diesel's well-known owner service policy and the ready availability of factory engineered replacement parts.

All this makes a GM Diesel a natural for any job you may have. It's an engine you'll want to learn about, so write today for the complete story.

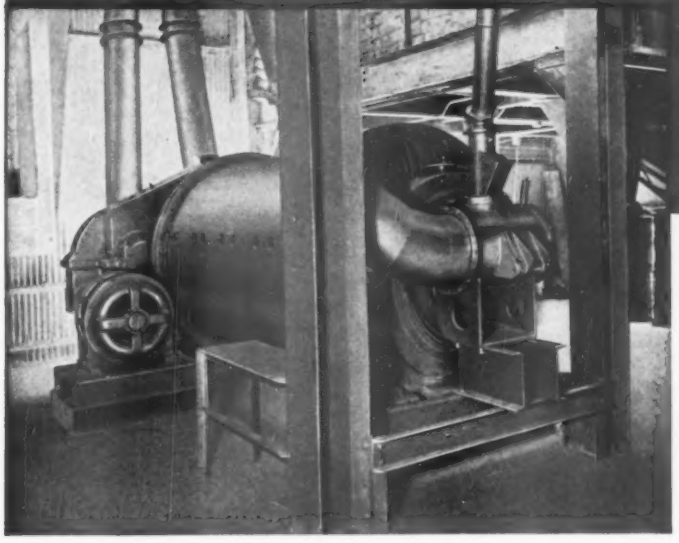
DETROIT DIESEL ENGINE DIVISION

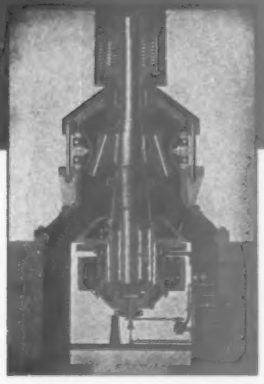
SINGLE ENGINES... Up to 200 H.P. **DETROIT 28, MICHIGAN** MULTIPLE UNITS... Up to 800 H.P.

GENERAL MOTORS

DIESEL POWER

KVS Machinery for AGRICULTURAL LIMESTONE AND LIME MANUFACTURE





KENNEDY ROLLER BEARING GEARLESS CRUSHER . . . .

With a Synchronous Motor built in its pulley, this machine shows 80% saving in the cost of maintenance and a saving of 50% in power over geared crushers. It has produced 156 tons per hour when set to 7/16" between the head and concaves at the bottom. The motor runs on roller bearings and is continuously lubricated by a force feed lubrication system. The motor is built especially for this crusher.

THIS 5½' x 8' KENNEDY AIR SWEPT TUBE-MILL PRODUCES 7 TONS PER HOUR — With a feed of ¼ x ¾ in. limestone and dust

Use the Kennedy Air Swept Tube Mill to get superfine grinding at bottom costs. The product ground in this tube mill and collected in three cyclones is (1) 5 tons per hr. of 80% thru 200 mesh, (2) 1 ton per hr. of 92% thru 200 mesh, and (3) 400 lbs. per hr. of 99.8% thru 325 mesh. Simple adjustment permits a desired variation from this combination of fine mesh sizes. The mill is driven through the remarkable Kennedy Integral Gear Drive for Tube Mills. This enables the motor to be direct-connected to the high speed shaft. The gears cannot be misaligned or set wrong. Power required to drive the mill is thus greatly reduced.

It is now possible to combine the superior product of a rotary kiln with the operating economy of a vertical kiln with the Kennedy Stone Preheater and Deheater. By partial calcining the material this system reduces kiln wear and kiln lengths. It recovers and utilizes exit gases, and has proved so efficient in actual operation that 40% fuel savings and increased output exceeding 20% have been obtained.

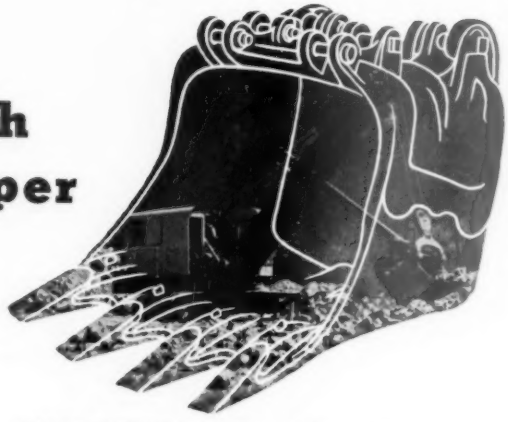
Short kilns employing the Kennedy method also acquire an internal glaze which lessens the wear on kiln liners, lowers the power requirements, and reduces formation of kiln rings. Overburned and underburned lime is practically eliminated. Coal feed and lime calcination are switchboard controlled.

The latest in scientific lime production KENNEDY STONE PREHEATER - ROTARY KILN DEHEATER and SOAKING PIT

20% Increase in Capacity — 40% Savings in Fuel

Kennedy-Van Saun Manufacturing and Engineering Corp.
2 Park Avenue, New York 16, N. Y.

A Good Shovel Works Better with an Amsco Dipper



Made of austenitic manganese steel for resistance to impact, pressure, and abrasion, Amsco dippers also provide the advantages of fast, full loading and quick, complete dumping. Design of Amsco dippers is based on an experience of forty years in fields of power shovel application. To make a good shovel work better, specify an Amsco dipper. Available in all standard capacities, up to ten cubic yards . . . and in types as outlined below.

AMSCO RENEWABLE LIP DIPPER

A strong, long-life dipper, designed for low overall cost. Patented Amsco construction makes it possible to replace worn lip quickly, holding down-time to a minimum. Teeth are also renewable and reversible.

AMSCO WELDED TYPE DIPPER

Designed to meet the demand for a strong durable dipper at minimum weight . . . for fast digging and economical use of power. Built in two types: Two Part (½ to 2 yards) and Four Part (2 yards and up); sections are joined by Amsco's patented plug welding process, with all joints overlapped for rigidity. Teeth reversible for double duty . . . and replaceable.

AMSCO DIPPERS for Special Purposes

AMSCO manufactures the famous Missabe Dippers and a wide range of cast manganese steel dippers and buckets for pull-shovels and underground work . . . as well as dippers of any design to meet any particular application.

AMSCO PARTS

AMSCO supplies cast manganese steel dipper and shovel parts, including: teeth, renewable lips, bails, racks and pinions, sheaves, gears, crawler parts . . . as well as a complete line of welding products for hardfacing and reclamation.

For full information on Amsco Dippers and parts—write for Bulletin 547-DS.

AMERICAN Brake Shoe COMPANY

AMERICAN MANGANESE STEEL DIVISION
CHICAGO HEIGHTS, ILL.

Foundries at Chicago Heights, Ill., New Castle, Del., Denver, Colo., Oakland, Calif., Los Angeles, Calif., St. Louis, Mo. Offices in principal cities. In Canada: Joliette Steel Limited, Joliette, Que.

Your

Union Multiwall Specialist

Knows many ways to cut packaging costs

HOW LONG has it been since an *expert* analyzed your packaging methods?

Recent improvements in packaging methods and materials now make Union Multiwall Bags the preferred packaging for many different commodities . . . over 300 in all. They speed up packaging, cut labor and shipping costs, guard against contamination.

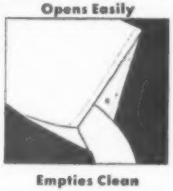
Even if you're now using multiwall bags, the Union Multiwall representative who calls on you can give you new ideas that may save you money. For he is backed by the specialized packaging knowledge of America's largest maker of paper bags—with its own forests, the largest completely integrated Kraft pulp-to-bag plant in the world, and skilled engineers and designers.

Let him show you how Union resources and packaging experience can help you!

Multiple Protection

Opens Easily

Prevents Siftage



Empties Clean

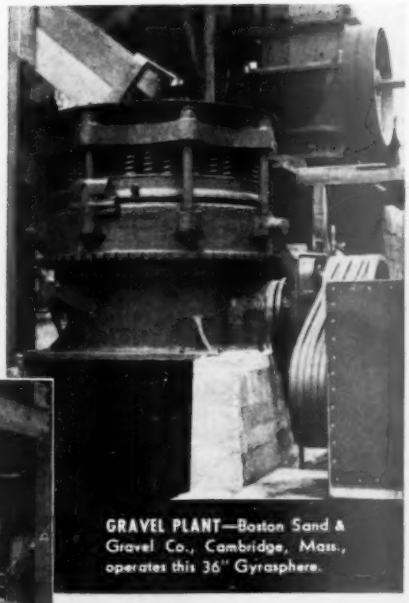
UNION Multiwall Bags

UNION BAG & PAPER CORPORATION

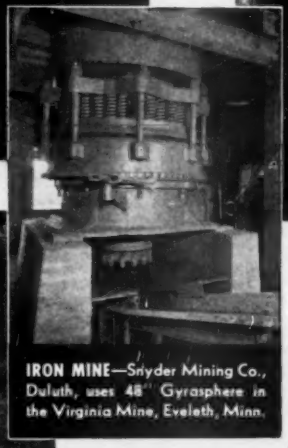
233 BROADWAY, NEW YORK 7, NEW YORK

TRADE MARK UNION

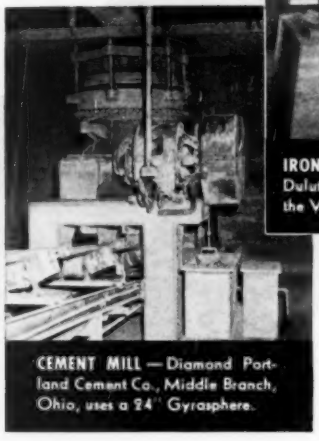
QUARRY PLANT—Arundel Corp., Baltimore, Md., operates six Gyrasphere Crushers of all sizes.



GRAVEL PLANT—Boston Sand & Gravel Co., Cambridge, Mass., operates this 36" Gyrasphere.



IRON MINE—Snyder Mining Co., Duluth, uses 48" Gyrasphere in the Virginia Mine, Eveleth, Minn.



CEMENT MILL—Diamond Portland Cement Co., Middle Branch, Ohio, uses a 24" Gyrasphere.

FINER CRUSHING

ENORMOUS TONNAGE

WIDER RANGE OF SIZES

IMPROVED PRODUCT

CONTINUOUS OPERATION

LOWER UPKEEP

TELSMITH

Gyrasphere SECONDARY CRUSHER

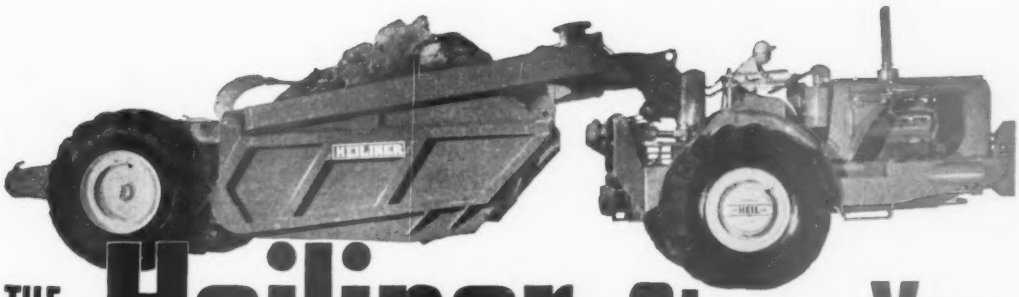
Send for descriptive Bulletin Y-11. Y-7

SMITH ENGINEERING WORKS, 508 E. CAPITOL DRIVE, MILWAUKEE 12, WISCONSIN

Cable Address: Sengworks, Milwaukee

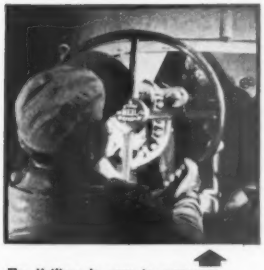
51 East 42nd St., New York 17, N. Y. • 211 W. Wacker Drive, Chicago 6, Ill. • 713 Commercial Trust Bldg., Philadelphia 2, Pa. • 238 Main Street, Cambridge 42, Mass. • Boehck Eqpt. Co., Milwaukee 3, Wis. • Mines Eng. & Eqpt. Co., San Francisco 4, Calif.

Clyde Equipment Co., Portland 9, Ore., & Seattle 4, Wash. • General Machinery Co., Spokane 1, Wash. • Brandeis Machinery & Supply Co., Louisville 8, Ky. • Rish Equipment Co., Charleston 22, & Clarksburg, W. Va.—Roanoke 7, & Richmond 10, Va. • Wilson-Weesner-Wilkinson Co., Knoxville 8, & Nashville 6, Tenn.



THE Heiliner Gives You Faster Haul Cycles

Puts More Profit in Your Pocket

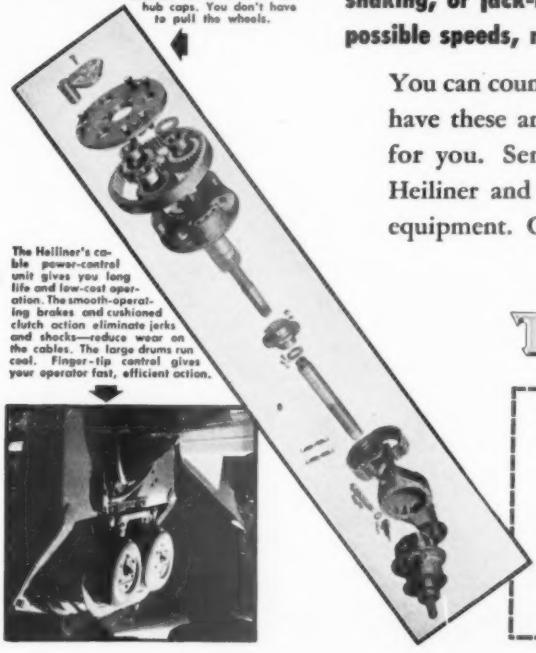


The Heiliner is easy to maneuver. Your operator can turn the 39-foot unit in a 22-foot radius. No physical effort is required — the Hydro-Steer does all the work.

1 Because the Heiliner's super-axle, with its overall gear reduction of 153 to 1, provides a low-torque drive that gets every bit of power out of the new 200-hp Cummins Diesel.

2 Because Heil's patented, positive Hydro-Steer prevents nosing, snaking, or jack-knifing—lets your operator run at highest possible speeds, make more round trips.

Heiliners cut maintenance down time and use it to move more dirt. The full-floating axle shafts and the wheel drive-gears are fully accessible on removal of the hub caps. You don't have to pull the wheels.



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"WE HEAR..."

May, 1949

According to a survey made by Business Week, business men are most concerned these days about recession, and then costs, labor, taxes and government controls in that order. According to industrial executives, a business decline is looked for this year. New orders will go down in the first six months, inventories up. Labor and material costs will rise somewhat. Those seeing a lower level of activity generally are in the machinery and machine tools fields.

* * * * * * * * * * *

An estimated 34,395 miles of state and federal aid highways will be built in 1949, costing approximately $1,233,546,000. These same expenditures increased from $846,153,000 in 1947 and $1,111,600,000 in 1948. And state highway maintenance expenditures are expected to reach a figure of $433,603,000.

* * * * * * * * * * *

J. M. Johnson, director, Office of Defense Transportation, proposed that the government construct 550,000 new freight cars at a cost of $2,500,000,000. He added that voluntary steel allocations to freight car manufacturers were discontinued on April 15, as there was more steel on hand than orders for new cars.

* * * * * * * * * * *

Secretary of the Interior Krug, in his annual report to President Truman, recommended a federal power program costing $12 to $15 billion. He said that 40 million kilowatts of hydro-electric power should be developed in the next 20 years, with 75 percent of this work done by the government. The Secretary of the Interior also urged an increased program in mineral prospecting and in finding methods for utilizing low-grade ores. Part of his program recommended dams on the Columbia River to boost aluminum output.

* * * * * * * * * * *

The Public Roads Administration states that revision of the national highway program, because of rising construction costs and transportation needs in general, is mandatory. Nearly 60 percent of the improved mileage now on the federal aid primary system will wear out within the next 10 years. The entire field of highway transportation needs to be re-analyzed in view of the present inability to keep pace with new demands for service.

* * * * * * * * * * *

Practice of following trucks by strikers to picket against handling of goods being transported can probably be forbidden under the Taft-Hartley Act as a secondary boycott according to a recent decision.

* * * * * * * * * * *

Employees in limestone and rock quarries, saw-mills and ready-mixed concrete plants are classed as seasonal workers in a bill recently submitted to the Missouri state legislature and termed a proposal for a state minimum wage law. Workers other than agricultural, seasonal, and interstate would get a minimum of 75 cents an hour.

WE HEAR

Contracts awarded for building and engineering works in the first 1949 quarter in the 37 states east of the Rockies declined 9 percent from the corresponding period last year. But non-residential building showed a gain of one percent for a total of $771,219,000. This increase was mainly attributable to public building contracts. Residential building volume is down 19 percent in general, with hotel building contracts down 36 percent.

* * * * * * * * * * *

An employer can sometimes be cited for failure to bargain in good faith for refusing to produce wage data requested by union representatives.

* * * * * * * * * * *

A $90,000,000 expansion program, involving railway, highway and power development, and large scale public works, will be undertaken by British Columbia over the next five years. The program includes a new $10,000,000, 3-year highway construction program to begin this year and a 5-year hospital building program to total $20,000,000, plus programs for school buildings, other general building projects, and 20 irrigation projects.

* * * * * * * * * * *

Construction costs dropped 1.4 percent during the six months ended April 14, which is a healthful sign. Lumber prices were the leader in the down-trend which should be a word of warning to producers of competitive materials who have profited due to high lumber prices. Construction costs overall still are seven percent higher than a year ago.

* * * * * * * * * * *

Deficiency in highway construction totaled $22,000,000,000 at the end of the war and, according to a Federal Works Agency survey, it is indicated that it will cost $3,000,000,000 annually for new construction and $1,000,000,000 per year for maintenance for the next 15 years.

* * * * * * * * * * *

Rep. Staggers, W. Va., recently introduced a bill in Congress that would start federal construction of a $12,000,000 super-highway network. The plan calls for a two-lane highway on a 450-ft. right-of-way from San Francisco to Boston; New York to Florida; the Great Lakes to Florida; Laredo, Texas, to Canada; and other routes to connect with the Pan American highway via Mexico.

* * * * * * * * * * *

The steel industry must expand its output by 12 to 15 percent within the next five years in order to meet normal demands according to a government economist who claims that inadequate steel supplies have cost the nation billions of dollars in finished products and wages.

* * * * * * * * * * *

Telephone and telegraph construction is up 54 percent over a year ago and will amount to $445,000,000 in 1949. Hospital and institutional construction is up 50 percent so far in 1949 over 1948.

* * * * * * * * * * *

In a recent survey conducted by the Commonwealth Edison Co., it appeared that Houston and the State of Texas are first in the field of postwar expansion. Houston leads all industrial areas in value of new plants with 83 projects costing an estimated $110,700,000.

* * * * * * * * * * *

Those who would criticize the construction industry for default in building needed housing should draw in their horns. More than a million houses and apartments built in 1948 set a new record for performance. According to the National Association of Home Builders, there was a strong trend in 1948 toward the construction of well-designed houses for lower income families.

* * * * * * * * * * *

Over $4 billion will be spent by the 48 states of the United States in the next two years for highway and public building construction, according to a recent survey taken By Engineering News Record.

THE EDITORS

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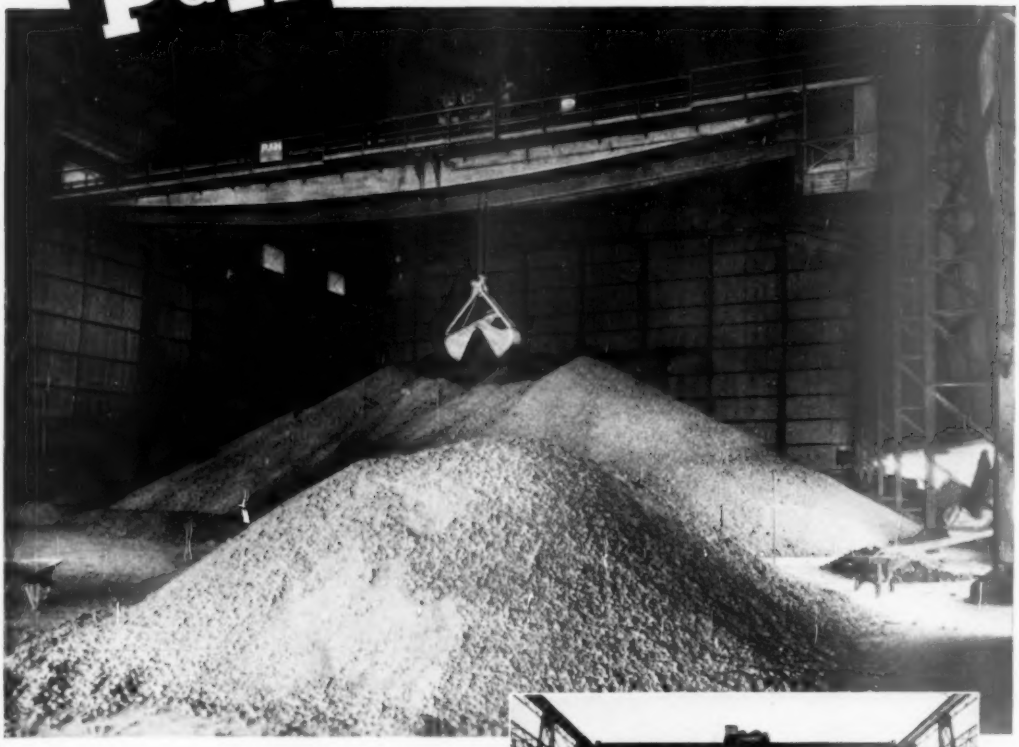

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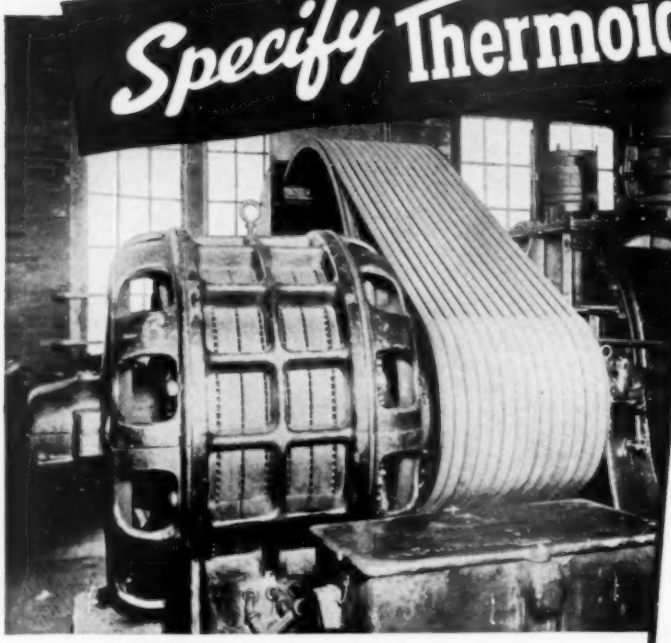

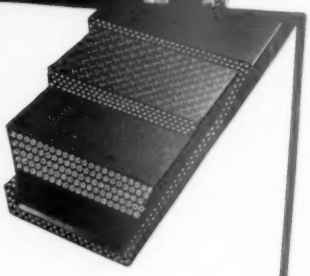

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★ ★ ★ Editor's Page

Where are the Unions' Ideas to Help Write Sound Labor Legislation?

THE APRIL issue of the *"Voice of the Union Cement, Lime, Gypsum and Allied Worker,"* published by the United Cement, Lime and Gypsum Workers International (A. F. of L.) carried a long and drawn-out tirade against the Taft-Hartley Law under the heading, "Lone Star Cement Corporation Favors Taft-Hartley Act." It constituted a heated rebuttal to an article entitled "Protecting Us Against Ourselves" which had been printed in the February issue of the cement corporation's monthly publication.

The article under criticism was interpreted as in support of the Taft-Hartley Law, which undoubtedly it was, but why should that excite anybody? Haven't many others, including a great many union men, recognized that there have been many abuses by unions which the Taft-Hartley Law was designed to correct?

It so happens that seven of the cement corporation's plants are organized under charters issued by this union and the union has all along been in opposition to the Taft-Hartley Law. The "freedoms" which were set forth in the February article, as afforded by the Law, were construed by the union as possibly directed at it and its officers specifically, which we doubt was the intent. We believe, and companies in the industry do too, that this union has a good reputation.

All Unions Not to Blame

As a case in point, one of the "freedoms" mentioned as provided by the Law was protection against workers losing their jobs by being called out on strikes in violation of contract. That statement among others was challenged but the union must have known that it was not being singled out for criticism; for this union admittedly has a good record for keeping to its contracts and hence has nothing to fear from the Taft-Hartley Law.

But the article under attack did serve the purpose of inspiring a lengthy tirade on the "abuses" of the Law that was nothing more than repetition of the stock arguments against the law that we hear from unions everywhere and, as usual, without constructive suggestion.

The Taft-Hartley Law was, however, written to correct abuses by other unions without so good a record as the United Cement, Lime and Gypsum Workers, and which have been recognized as very real abuses of workers as well as employers. This union nor any other union has offered any suggestions for correcting these abuses, either at the time of the hearings leading to enactment of the Taft-Hartley Law, or now.

Unions are now in the position of having to justify the extraordinary privileges and advantages they have acquired at the expense of the public interest, because of the fact that some have abused them. It cannot be done simply by saying that this union or that union is pure or that the majority of unions are pure. They must come out with constructive suggestions on ways to cure their own abuses.

The Taft-Hartley Law was not written by lobbyists for the National Association of Manufacturers as charged but by some of the most conscientious men in Congress. Its very real purpose is to protect the inalienable right of any man to earn an honest living.

Recommended Changes

Its authors and all members of Congress have time and again expressed a desire to amend the law in order better to accomplish its purpose without in any way injuring legitimate activities of labor unions. Only recently, Senator Taft himself has come out with proposals of amendment that grant definite concessions and remove many of the features considered so objectionable by unions.

The wise and politic thing for the unions to do is to freely acknowledge that the Wagner Act and the way it was interpreted led to abuses, that they in the interests of their own good name and for the benefit of their own members should find ways to correct.

In the meantime, labor hasn't fared so badly under the Taft-Hartley Law. A survey has revealed that the average pay of industrial workers has increased about twenty-five percent and that union membership has been enlarged five percent while the law has been in force.

Nevertheless, leaders of the big unions, despairing some in their desires for an easy labor law, are setting their sights to re-shape Congress in 1950 in reprisal, should the present Congress fail to adopt a labor law favorable to them. Employers and such of their employes as are aware of the drive to substitute labor bosses for their own political power might well consider taking steps, by letter and by all other means, to stiffen the backbones of their Congressmen in this crisis.

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Rocky's NOTES

Nathan C. Rockwood

Granular Subbases for Concrete Pavements

EACH YEAR sees added evidence and acknowledgment that at least part of the failures of portland cement concrete pavement are caused by lack of a suitable subbase. The "pumping" of pavements at joints and cracks has now been studied scientifically in most of our North Central prairie states, and always with the same conclusion: that it is the result of having placed the concrete on the native "mud" soils, which made this area the Nation's corn belt, but should not have been expected to support unballasted railway tracks or concrete slabs. Railway construction engineers never assumed these soils would support tracks, but for some reason promoters and builders of concrete pavement did assume that *it* needed no "ballast."

On the whole, concrete state highways of Illinois are among the best we have encountered anywhere in the United States. Workmanship and materials have always been good, in spite of the fact that many hundreds of miles were constructed within a few years' time, and partly for the purpose of using their construction for political capital. There are still many miles that show almost no signs of deterioration, but they are mostly on country roads not subjected to constant heavy motor-truck and bus traffic. There probably is no doubt in any motorist's mind that increasing wheel loads and density of truck traffic are the chief destructive agencies so far as pavements in the northern part of Illinois are concerned.

Survey of Pumping

The recent Research Report, No. 1D, Highway Research Board, on "A Survey of Pumping in Illinois," by the Illinois Division of Highways and the Portland Cement Association, with soil tests by the Public Roads Administration, is of particular interest. It covers 14 northeastern counties, surrounding Chicago, a territory we are familiar with from having traveled these highways for more than 30 years; and during those 30 years most of them were constructed. It is a thorough-going survey and was made under natural conditions that permitted investigators to eliminate factors which are sometimes confused with this cause for pavement failure.

Fortunately the Portland Cement Association had a part, because it was partly the promotion methods of the P.C.A. 25 and 30 years ago that were responsible for the construction of pavements on the native soils without benefit of suitable subbases or ballast, in violation of good highway engineering practice of the past 100 years or more. Another reason, of course, was that the pavements were constructed chiefly from the proceeds of two large bond issues, under political conditions that made it essential to provide as many miles as possible, which did not leave much money for preparation of a subbase, whether the engineers believed one was necessary or not.

This report does not say so, but we believe that nearly all the pavements surveyed and investigated were constructed with sand and gravel aggregates of glacial origin and commonly described as Elgin, although by no means all comes from the vicinity of Elgin, Ill. These gravels are nearly all limestone or dolomite, and even the sand is commonly 25 to 30 percent or more limestone. There are occasional pebbles of hard rock and a few of softer rock than limestone, which disintegrate and leave small cavities in the pavement surface, but, on the whole there are probably no better concrete aggregates anywhere.

The survey data take into consideration the weather conditions and rainfall, the pavement design, including width, number and type of joints, the condition of road shoulders and drainage, kind and density of traffic, and other relevant items. Core holes were made in the pavements and the character of the subgrades and subbases tested. Our readers are concerned chiefly with the effects of the lack of subbases, for this is a growing market for the producers of aggregates of all kinds. It is hardly conceivable that highway engineers anywhere will now construct new concrete pavements without benefit of a suitable granular subbase.

Also, it is becoming apparent that subbase material is not anything that can be picked up by the roadside. It must be especially prepared to fulfill a specific need. The present opinions of highway engineers in the various states differ somewhat on these needs. The Illinois engineers had previously expressed an opinion that any compacted material would serve the purpose.

Granular Subbases Prevent Joint Pumping

Some of the conclusions from this report are therefore of particular value to producers of aggregate, because of the emphasis on the necessity for granular subbases, and because it exposes some fallacies that were current when concrete pavements were being promoted for cross-country highways. For example, it is concluded from experience with these pavements from 6 to 10 in. thick, that there was no indication the thicker pavements pumped less than the thinner ones. Marginal bar reinforcement did not prevent pumping; mesh reinforcement eliminated pumping at intermediate cracks, but did not prevent pumping at joints. Load transfer devices, such as dowel bars, J-bars, and various patented devices as a whole were not found to reduce pumping. At most, thicker pavements and joint devices could only increase the resistance to the start of pumping.

There was little difference between the amount and severity of pumping in cuts as compared to pumping on fills. It was also concluded from other evidence, that subgrade drainage was not necessarily an important factor. The only conditions which insured no pumping were where the pavement subsoil or subbase was granular material containing more than 55 percent of particles retained on a No. 270 mesh sieve. Elsewhere, in Iowa, for example, highway engineers have set the limit at 50 percent, plus No. 270 mesh. Probably, the somewhat coarser material is the better.

Illinois engineers apparently prefer a graded subbase material that will pack well. The advantage of a well packed subbase is that it will keep the subsoil from coming up through, and it will not hold enough water, evidently, to be harmful, at least so far as pumping is concerned. There has been some experience with faulting at joints even on granular subbases, where lack of sufficient compaction and subsequent settlement created holes under the pavement.

Subbases experimented with in Illinois are usually 6 in. thick except where a new pavement has been placed on top of an old one, when as little as 2 in. has proved satisfactory. As much as 48 in. of thickness has been used to correct frost-heaving soil. Trenched subbases a few feet wider than the pavement and not provided with any drainage facilities are said to give satisfactory performance.

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LABOR RELATION TRENDS

Management Problems and Human Idiocyncrasies

By NATHAN C. ROCKWOOD

THE REPORTS OF ARBITRATORS called in to settle disputes over employe grievances are ever a source of light on worker psychology. Sometimes it would seem the life of an arbitrator, if he would be just and understanding, calls for the wisdom of a Solomon. The three examples which follow may therefore prove both interesting and helpful to management in understanding, and possibly avoiding, some of the every-day pitfalls that arise in all kinds of industry or business.

Dealing with Absenteeism

An employe of the Pittsburgh Metallurgical Co., Niagara Falls, N. Y., received an urgent letter from a brother in Georgia to return there and complete a deal involving a home for their mother. The time was the week before Christmas. The company management, harassed as usual by many requests for extra days off around Christmas, refused permission for a leave after December 30. To grant this and many similar requests, the management said, would have disrupted operations.

The employe went anyhow, and the management thereupon fired him, but almost immediately rehired him. However, he thus lost seniority rights, and the union and the company submitted the disputed discipline to an arbitrator, according to the terms of their contract. The contract provided that "leaves of absence shall be granted for reasons acceptable to the company and union," and that "seniority may be broken in three-day absence without good cause," the determination of whether the cause was good or otherwise was to be based on "reasonable and nondiscriminatory appraisal of the facts in each case."

The arbitrator's decision that the employe *did not* absent himself without good cause, contained these two revealing paragraphs: "Was the refusal here to grant leave 'unreasonable' or discriminatory'? I think it was both despite the fact that the company's purpose and intention were reasonable. Its policy as it operated here produced an effect which as it concerned this employe was unreasonable and discriminatory. It must be granted that the company is faced with a problem in connection with leaves during the Christmas holidays. Because of that, it can require a more convincing demonstration of need. It can refuse leave where the employe's purpose can be substantially served by leave at a later time. But the company's action here was in effect based on the premise that it would refuse leave however strong the showing, however much it might appear that the need was for leave now and not later. The company's policy would force this employe either to refuse to obey a strong moral obligation thus injuring his self-respect, or to give up his job, a dilemma which a proper interpretation would avoid. This employe submitted written evidence [a letter from his brother] that such was the case. But because it was Christmas—a strange irony—the normal operation of the leave policy was denied him. This worked a discrimination against him.

"It will, perhaps, be argued that the company can in no other way 'hold the line' than by absolute denial of leaves at Christmas. There are unfortunately situations in which claims otherwise just must be denied for such reason. But a need for absolute power is not to be lightly assumed. It will be urged, of course, that whatever the true facts, employes will regard grant of leave to one, and refusal to another, as discrimination. But any policy will produce some misunderstanding and sense of injury (as this case shows). In this very case it was admitted that no other person asking for leave presented what amounted to documentary verification. We can, I feel, operate on the principle that the majority of employes of this plant will have greater respect for a policy, that though stern, admits of exceptions fitted to real need, than one which shuts off any consideration of the merits. Most men in their hearts know the difference between real need and a bluff. They look for an administration which is not afraid to make distinctions between the true and the fake."

The employe was accordingly reinstated with his seniority intact. Under the circumstances, he probably feels grateful to his union, and its influence and power over all its members are strengthened.

Communal and Company Relationship

The case of the Bethlehem Steel Co. and the United Steel Workers Union (C.I.O.) at its Cornwall ore mine, Cornwall, Penn., we imagine could have many counterparts. This is a small isolated operation with less than 100 employes, where both bosses and workers call each other by their first names. An employe was discharged for an infraction of the company rules in appropriating for his own use some angle irons and steel plate he wanted for an automobile trailer he was building. Also, at the time he was supposed to be working for the company, the foreman found him in the shop having another employe cut the angle irons to his measure. On top of that he also removed, and sneaked home during his early morning lunch hour (on the night shift), a 6 x 4 ft. ¼-in. steel plate, which he also had cut to fit his needs.

It appeared from the ready testimony of his fellow workers that it was common practice for them to obtain company "scrap materials" in this way, the only formality being that they were expected to obtain "material passes" from the superintendent, and by a kind of unwritten code they were not supposed to take anything of greater value than $2 (at any one time). The employe in this case did not get a material pass, although directed to do so by his foreman, and the value of his loot was nearer $5 than $2. However, he made no attempt to conceal the material, it was there in his yard when the superintendent and foreman visited him.

The arbitrator, in his decision, gives a somewhat rapturous description of the unusual "communal and company relationship," and the "easy-going human relationships that furnish the context in which understanding of this whole unfortunate, yet warmly unique situation must be sought." So, said the arbitrator: "In my judgment this case must be decided within this whole context. But the existence of the code [of honor, referred to above] does not lessen the employe's responsibility; rather does it augment it. For today, when we all ponder anxiously the impact of bigness—of big government, big business, and big unions, upon daily human relationships—this code developed by management and men at Cornwall seems a very fine and precious thing."

The upshot of the whole rather lengthy discussion in a similar vein is that this employe's infractions of the code, and his added insubordination in not following his foreman's instructions, merited a penalty, but that instead of discharge it should have been merely a suspension. The arbitrator accordingly ordered him reinstated with full seniority, but disallowed his (and his union's) claim for "all wages lost." His period of separation from his job (about six months) was deemed a proper disciplinary suspension.

Discharge for Inciting Strike

The third case involved the Birmingham Slag Co., Birmingham, Ala., and the employer's right, under a C.I.O. union contract, to discharge two members of the union's grievance committee, who promoted a strike at all the company's slag plants, because they didn't like changes made in the operation of a diesel locomotive. The contract provided for grievance procedure and prohibited strikes. It further provided that discharges were to be only for "just cause."

A locomotive inspector for the Interstate Commerce Commission mak-

(Continued on page 98)

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the *Personal Side* of the news

Director Resigns

FRED F. BARTEL has resigned as assistant director of engineering of the National Sand and Gravel Association and as assistant to the director of engineering of the National Ready Mixed Concrete Association to accept the position of engineer for the Tews Lime and Cement Co., Milwaukee, Wis. He will be succeeded by DELMAR L. BLOEM, associate research engineer, and E. J. ZEIGLER, assistant research engineer since 1946, will replace Mr. Bloem as associate research engineer in direct charge of laboratory activities at the University.

Fred F. Bartel, left, and Delmar L. Bloem of the Washington engineering staff

Mr. Bartel first became active in the Association's work when he was appointed to the Research Fellowship at the University of Maryland sponsored by the National Sand and Gravel Association Research Foundation. During the war he served as an officer in the Ground Forces of the Army Air Corps, being discharged with the rank of Captain. He holds the degree of Bachelor of Science in Civil Engineering from the University of Wisconsin and of Master of Science from the University of Maryland. He has been active in committee work of the A.S.T.M., the American Concrete Institute and the Highway Research Board. He served as assistant secretary of A.S.T.M. Committee C-9 on Concrete and Concrete Aggregates.

Mr. Bloem joined the Association's staff in 1945 and has been actively in charge of research activities at the University of Maryland for both the National Sand and Gravel Association and the National Ready Mixed Concrete Association. He is a graduate of the Iowa State College with the degree of Bachelor of Science in Civil Engineering. He is the author of several papers dealing with concrete and concrete aggregates which have been published by the Associations, the American Concrete Institute and the American Society for Testing Materials.

Mr. Zeigler is a graduate of the University of Maryland with the degree of Bachelor of Science in Civil Engineering. He served as a part-time student-assistant in the laboratory while attending school and joined the full-time staff as assistant research engineer in 1946.

Heads Builders Exchange

W. BRUCE WALTER, sales manager for the Johns-Manville Corp., New York, N. Y., has been named president of the Cleveland Builders Exchange, Cleveland, Ohio. NELSON E. W. STUART, Cleveland Quarries Co., Cleveland, Ohio, was elected a director for a two-year term.

Penn-Dixie Appointments

H. W. RICH, superintendent of Plant No. 4 of the Pennsylvania-Dixie Cement Corp., Nazareth, Penn., has been appointed superintendent of the northern division. W. P. GANO, who has been general superintendent in the north since 1933, has been named chemical engineer, with headquarters in Nazareth, and L. C. HAWK, chief chemist of the northern division and manager of the research laboratory at Nazareth, has been appointed research director.

Mr. Rich graduated from Lehigh University as a mining engineer. His early experience was in copper and silver mines in South America, and as West Coast representative of the Worthington Pump and Machinery Corp. in Chile, Peru and Bolivia. Upon his return to the United States, he joined the U. S. Gypsum Co. as mine engineer at Oakfield, N. Y., and later served as acting superintendent at the Genoa lime plant. He joined Penn-Dixie in 1941 as quarry superintendent and a year later became superintendent of Plant No. 4.

Mr. Gano became interested in the chemical profession while employed at Lafayette College. He later joined the Edison Portland Cement Co. and then the Dexter Portland Cement Co., serving in both companies as assistant to the late Richard K. Meade. He was chief chemist for the Alsen Cement Co. prior to joining the Pennsylvania Cement Co. in 1908. When Pennsylvania-Dixie Cement Corp. was formed he was made assistant general manager of the northern division and in 1933 was appointed general superintendent.

Mr. Hawk is a graduate of Lafayette College, where he took post-graduate work in chemistry before entering the employ of the Dexter Portland Cement Co. in 1909 as chief chemist. Since 1926 he has served Penn-Dixie as chief chemist of the northern division and as manager of the research laboratory at Nazareth.

Philip E. Heim, vice-president in charge of sales, The Carbon Limestone Co., Youngstown, Ohio, appointed vice-president

Named Vice-Presidents

EDWIN P. WEESE, vice-president and operating head of The Carbon Concrete Brick Co., a subsidiary of The Carbon Limestone Co., Youngstown, Ohio, has also been appointed vice-president in charge of operations of The Carbon Limestone Co., and Philip E. Heim, manager agstone sales, has been named vice-president in charge of sales.

Manages P.C.A. Bureau

LEO H. CORNING has been appointed manager of the Structural and Railways Bureau of the Portland Cement Association, Chicago, Ill., to succeed the late Arthur J. Boase, who passed away February 9. Mr. Corning joined the Association in 1929 and has been assistant manager of the Bureau since 1935. He was graduated in civil engineering and received his B. S. and C. E. degrees from Case Institute of Technology. During World War I, he served as an engineering instructor

U. S. Visitor

G. RHEAM, chief engineer of the Associated Portland Cement Manufacturers, Ltd., London, England, is making a tour of the United States for the purpose of visiting cement plants in various sections of the country.

Engineer Retires

HARRY E FRECH, district engineer in the St. Louis office of the Portland Cement Association, Chicago, Ill., has retired after 30 years of service with the Association, which he joined in 1919 as a field engineer in Missouri. He will be succeeded by CARL J. CHAPPELL, field engineer in Missouri since 1945. Mr. Frech became district engineer in 1920 and served continuously in that capacity until his retirement except for an eight months' leave of absence in 1941 to serve with the U. S. Army as Chief Zone Engineer for the 7th Construction Zone of the Quartermasters Department at Omaha. Mr. Chappell, a civil engineering graduate of Kansas State College, joined the New York office of the P.C.A. in 1940 as a soil-cement engineer and was appointed field engineer for the state of New Jersey in 1943. In 1945 he was assigned to the St. Louis district as field engineer for Missouri.

Receives Award

ELMER F. ARMBRUST, president and founder of the Armbrust & Son Ready Mix and Building Supplies Co., and the Sugar Creek Quarries, Washington C. H., Ohio, was recently awarded a jeweled pin as one of Fayette County's All-American Golden Rule Honor Citizens. The presentation, which is the sixth of its kind, was made to Mr. Armbrust as a self-made man who has won pronounced success the hard way under the great handicap of blindness. Some of his greatest achievements in the business field have been made since he became blind about eight years ago, and his spirit and enthusiasm have carried him to the top in his chosen profession.

Association President

ADOLPH TEICHERT, JR., president, A. Teichert & Son, Inc., contractors of Sacramento, Calif., has been elected president of The Associated General Contractors of America for the year 1949, succeeding Dwight W. Winkelman, president of D. W. Winkelman Co., Syracuse, N. Y. WALTER L. COUSE of Walter L. Couse & Co., Detroit, Mich., succeeds Mr. Teichert as vice-president of the Association. Among the directors are Albert D. Blakeslee, C. W. Blakeslee & Sons, Inc., New Haven, Conn., and Edward O. Earl, San Xavier Rock and Sand Co., Tucson, Ariz.

A.I.M.E. Secretary

EDWARD H. ROBIE, who has been acting secretary of the American Institute of Mining and Metallurgical Engineers, New York, N. Y., was made secretary at the recent meeting in San Francisco.

Edgar K. Miller

Appointed Treasurer

EDGAR K. MILLER has been appointed treasurer and assistant secretary of the North American Cement Corp., New York, N. Y., succeeding Chas. R. Parks, who has retired after 48 years of service with North American and predecessor company. Other officers of the company are: John J. Porter, honorary chairman of the board; Albert M. Andreas, chairman of the board; Perry W. Andreas, assistant to the chairman of the board; Thomas J. Harte, president; Edwin S. Guth, vice-president in charge of operations; Roy S. Adkins, vice-president in charge of sales; Alexander M. Tyree, secretary; Francis B. Cummings, controller and assistant treasurer; Walter E. Laut, assistant controller; and Russell E. Van Noy, assistant secretary.

New Dravo Directors

GORDON W. CAMERON, treasurer of the Aluminum Co. of America, has been elected a director of the Dravo Corp., Pittsburgh, Penn. LOUIS A. MERTZ, vice-president and treasurer of the Dravo Corp., and HOWARD H. STURDY, general manager of the contracting division, have also been named directors. In addition, Mr. Sturdy and BYRON E. RHOADS, chief engineer of the contracting division, were appointed vice-presidents.

Heads Engineering Firm

HAROLD H. WHITE has resigned from the Atlas Powder Co., Wilmington, Del., to become head of a newly-formed consulting engineering company of Texas engineers and scientists. Object of the company will be the control of blasting in settled areas and measurement of blast vibrations. Headquarters of the firm will be in Houston, with branches in New York, Chicago, and Cleveland.

Chief of Engineers

MAJOR GENERAL LEWIS A. PICK has been nominated by President Truman to succeed Lieutenant General R. A. Wheeler as chief of engineers, U. S. Army. His nomination requires Senate approval. Gen. Wheeler retired from active duty in the United States Army on February 28, 1949, after 42 years of military service, and is now engineering advisor for the International Bank for Reconstruction and Development, known as the World Bank. A native of Peoria, Ill., he was graduated from West Point in 1911, and commissioned in the Corps of Engineers. He became chief of engineers by Presidential appointment in 1945.

General Pick was born at Brookneal, Va., on November 18, 1890. At the beginning of World War I, he was appointed First Lieutenant, Engineers Reserve. After service in France and at Ft. Mills, Philippine Islands, he returned to United States where he prepared Engineer Training Regulations at Fort Humphreys, Va., until September, 1923, when he was detailed to the Engineer School as a student. Upon graduation in 1924, he was assigned to the Reserve Officers Training Corps at Camp Meade, Md. In September of that year he became Professor of Military Science and Tactics, Alabama Polytechnic Institute, Auburn, Ala., and a year later was made military assistant to the district engineer, New Orleans district, and then district engineer, serving until 1928, when he transferred to College Station, Texas. Four years later Gen. Pick was assigned to the command and general staff school at Ft. Leavenworth, Kan., grduating in 1934. Promoted to Major, he remained as an instructor until 1938, when he entered the Army War College, Washington, D. C. Upon graduation a year later, he became executive assistant to the division engineer, Ohio River Division, Cincinnati, Ohio, and in 1942 was named division engineer, Missouri River Division, Omaha, Neb.

In October, 1942, Gen. Pick was sent to the China-Burma-India theater of operations, where he achieved one of the great engineering feats of military history—the construction, operation and maintenance of the Ledo Road. He returned to the United States in 1945 and was assigned to the office of the Chief of Engineers, Washington.

On Advisory Committee

WALTER C. SNELLING, consulting chemist and research director, Trojan Powder Co., Allentown, Penn., has been appointed to the Atomic Energy Commission's advisory committee on raw materials.

Receives Service Award

PROF. CHARLES H. SCHOLER, head of the applied mechanics department, Kansas State College, Manhattan, Kan., has received the distinguished service award from the highway research division of the National Research Board, Washington, D. C. This is only the second such award made by the Board. Prof. Scholer pioneered studies on concrete durability. As early as 1926 the American Society for Testing Materials published his study of accelerated freezing and thawing tests on concrete. He also has made numerous reports to the American Concrete Institute and the Highway Research Board for their publications.

Director of Research

DR. GEORGE W. WARD, chairman of the inorganic chemistry division of the Midwest Research Institute, Kansas City, Mo., and a former member of the Portland Cement Association, has been appointed director of research of the Gustin-Bacon Manufacturing Co. Dr. Ward, one of the original staff members of the Institute and organizer of the inorganic chemistry division, has been in charge of an extensive research project on glass fibers for the company.

Research Assignment

RAYMOND B. SEYMOUR, formerly chief chemist for the Atlas Mineral Products Co., Mertztown, Penn., has returned to the company as executive vice-president and general manager. One of Dr. Seymour's assignments will be the direction of research toward the improvement and development of new protective coatings, linings and cements for the chemical, metal processing, steel, petroleum, rayon, food, paper, leather, and textile industries.

Sales Representative

VERNON SWAN has been appointed sales representative at Dixon, Ill., for the Zonolite Co., Chicago, Ill., miners and processors of vermiculite, and will handle the full line of the firm's vermiculite products, including lightweight, fireproof plaster and concrete aggregates and acoustical plastic.

Named President

ROBERT A. BRUCE, Keosauqua, Iowa, has been named president of the newly organized company which was formed to take over Douds Quarries, Inc., Douds, Iowa, after the heavy floods of two years ago. Other officers are Clarence Pedrick, vice-president, and Arthur J. Secor, secretary-treasurer.

OBITUARIES

FRANK W. RENWICK, the first president of the National Sand and Gravel Association, a life-long member and promoter of all association activities, and president of the Chicago Gravel Co., Chicago, Ill., died at his home in Geneva, Ill., April 12 at the age of 82 years. Practically all the members of the Association, throughout its life, have known and honored Frank Renwick as the dean of the industry. This journal is especially indebted to him, for when ROCK PRODUCTS was taken over by the Tradepress Publishing Corp. in 1917, the new staff knew little about the industries it was intended to serve, and Frank Renwick was about the first contact made, and he proved then and ever since a helpful and steadfast friend.

Frank W. Renwick

Frank Renwick was born in Elgin, Ill., on February 5, 1867. His first regular business connection was with the Bowman Dairy Co., in 1890. After some later experience in real estate, he became interested in the commercial production of sand and gravel about 1895, and the following year built his first plant at Plainfield, Ill., which incidentally was one of the very first commercial sand and gravel plants in this part of the country. Prior to that time most of the concrete in this locality—largely sidewalks and foundations—was made of crushed stone from quarries which surround Chicago.

The Chicago Gravel Co. was organized at the beginning of the century, and a few years later we find Frank Renwick the leading spirit in the organization of a National Association of Sand and Gravel Producers. Although these early attempts to organize on a national scale met with indifferent success, Mr. Renwick never rested from his labors for the industry as well as for his company. So, in 1916 and 1917, conditions came about to make his efforts successful, and he became the first president of the present National Sand and Gravel Association.

Mr. Renwick was also active in many civic concerns. He was a member of a pioneer Fox Valley family. His father was a major in the Union army during the Civil War. Besides the Chicago Gravel Co., Frank Renwick was an officer or director in various Fox Valley public and private enterprises. He was a 32nd degree Mason, and a member of the Masonic Order for over half a century.

Surviving are two sons, George W. Renwick, who has been active head of the Chicago Gravel Co., for the past few years; Frank W., Jr., an attorney of Colorado Springs, Colo., and a daughter, Mrs. Homer S. Watt (Ruth) of Hinsdale, Ill. Mrs. Frank W. Renwick (Margaret Ann Concannon, of Elgin, Ill.) died several years prior to her husband. There are four grandchildren.

SANFORD E. THOMPSON, president of Thompson & Lichtner Co., consulting engineers specializing in construction materials, died recently in Phoenix, Ariz. He was 82 years of age. Mr. Thompson was an authority on management and industrial problems. A graduate of Massachusetts Institute of Technology, 1889, he was the author of many technical articles on construction materials.

OSCAR LAMPL, assistant manager of Dravo-Doyle Co., Pittsburgh, Penn., died suddenly at his home on March 23. He was 44 years old. Before joining Dravo-Doyle Co. in 1937, Mr. Lampl was associated with Blaw-Knox Co., Great Lakes Glass Co. and the Truscon Steel Co.

KENNETH K. KLUTZ, president and general manager of the Akron Brick and Block Co., Akron, Ohio, which he organized in 1945, died March 26 after an illness of four months, He was 48 years old. Mr. Klutz was also president and general manager of the J. P. Loomis Coal and Supply Co., Akron, with which he became affiliated in 1941. He was born and educated in Massillon, Ohio, where he was associated with his father in the coal business, later joining the Massillon Washed Gravel Co. He subsequently became affiliated with the Metropolitan Concrete Co. and then the Standard Portland Cement Division of the Diamond Alkali Co. in Cleveland.

SAMUEL C. KNARR, former superintendent of the Destport Rock Quarry, Indianapolis, Ind., passed away March 15. He was 86 years of age.

LEWIS H. ROSEBERRY, retired expert in the construction and design of cement plants, died March 17 in Easton, Penn. He was 86 years old.

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The line-up of Texaco lubricants for contractors' equipment also includes *Texaco Ursa Oil X***, designed to keep Diesel and heavy-duty gasoline engines clean . . . and *Texaco Track Roll Lubricant* to give rollers extra protection against dirt and moisture.

Use Texaco's Simplified Lubrication Plan to get better, more economical performance from *all* your equipment. A Texaco Lubrication Engineer will gladly tell you about it. Just call the nearest of the more than 2300 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, New York.

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INDUSTRY *News*

Cement Company Rehabilitation Program

MONARCH CEMENT CO., has announced that the first phase of its extensive construction program underway at its Humboldt, Kan., plant is scheduled for completion during 1949. The rehabilitation program, according to Walter H. Wulf, president, consists of the replacing of present equipment with new and more modern equipment. The first phase, costing $1\frac{1}{2}$ million, was started in 1946, and installations are being made without interrupting production.

Improvements made include installation of a 230-ft. Allis-Chalmers kiln which will eventually replace three smaller ones now in operation; installation of an Allis-Chalmers air-quenching clinker cooler, 70 ft. in length; installation of a new 300-ft. concrete stack; installation of two new boilers; and installation of a coal mill and complete new coal handling equipment and accessories.

Second phase of the contemplated overall program calls for another large kiln, an air-quenching clinker cooler and a third boiler, which, when installed, will completely replace the present kiln, cooler and boiler setup. During 1948, the company shipped an average of 120,000 bbl. of cement per month.

California Cement

CEMENT MILLS on the West Coast will have another capacity year in 1949. However, more balance is being achieved in supply and demand, and no shortages are anticipated.

In 1948, West Coast mills did not maintain the national average of production gains although they turned out 8 percent more than in 1947 to set another record. The national gain was 10 percent. The Western mills shipped about all the cement they could make and, except during bad weather at the end of the year, ran as close to capacity as they could along with extensive overhaul in some plants.

Altogether the West Coast accounted for about 15 percent of 1948 national cement production and shipments. Output was 24,604,000 bbl. compared with 22,789,000 bbl. in 1947.

Prices have moved up slowly, the general rise having been about 25 percent in two years in California and somewhat less in the Pacific Northwest where prices customarily have been higher than in California. Abandonment of basing points has had only local effects thusfar.

Military Explosives In Underground Mines

SHAPED EXPLOSIVE CHARGES used effectively by American armed forces in demolition and for penetrating armor during World War II are too hazardous and expensive for use in blast-hole drilling in underground mines, according to a report of investigations released by the Bureau of Mines.

The experiments, conducted at the Bureau's Market Weather, Va., testing tunnel, showed that the cost of blasting drill holes with shaped charges was approximately $8 per foot or "more than 20 times that of producing a better hole with a rock drill." Furthermore, the concussion produced by the shaped charges would prohibit their use in many mines, the publication points out. When pentolite is the explosive used in the charge, the liberation of excess carbon monoxide creates an additional hazard.

During the experiment, two series of tests were made with 15- and 40-lb. military-type charges on both hard and soft rock formations. Full-page photographs of the blasting equipment as well as detailed descriptions of the testing procedures employed in the study are given in the Bureau's report.

Quarry Operation

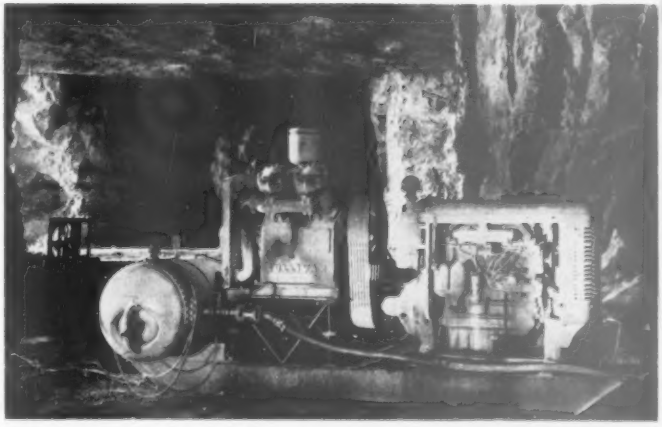
WILLIAM CONDON, superintendent, Wapello Stone Co., Inc., Ottumwa, Iowa, has announced that the Ottumwa quarry is now producing 100 tons of agricultural limestone per day as well as large tonnages of crushed stone for roadways. Concrete Materials Co., Inc., Cedar Rapids, Iowa, is conducting stripping and quarrying work for Wapello Stone Co.

Expands Holdings

MARBLEHEAD LIME CO., Chicago, Ill., has purchased approximately 105 acres of land south of Hannibal, Mo., where the firm has offices and an agricultural limestone plant.

Agstone Plant

LUNDIN CONSTRUCTION CO., Mankato, Minn., has set up an agricultural limestone plant at the T. R. Coughland Co. quarry.



Skid-mounted compressor unit located in the underground operation of the Warren Limestone Co., McMinnville, Tenn. This mobile unit, a Sullivan No. 210 air compressor powered by an International UD-14 diesel engine, is towed wherever needed by a crawler-type tractor in this 700 t.p.d. crushed stone and agricultural limestone operation

U. S. Gypsum Plans Nevada Plant

U. S. GYPSUM CO. has announced that construction work will start soon on a proposed plant and housing unit at Gerlach, Nev. Products to be manufactured would include wallboard in standard and insulating and woodgrained types; rocklath plaster base in a full range of items; sheathing for use under exterior sidings; building plasters, and agricultural gypsum for use as fertilizer. The board plant, 1200 ft. in length, will be of steel frame construction with a gypsum roof deck and gypsum walls.

Officials also disclosed that building materials will be furnished to northern California, including the San Francisco Bay Area, Nevada, Oregon and Washington.

Install Digging Ladder on Sand and Gravel Dredge

DRAVO CORP. has announced that its sand and gravel dredge No. 9 has been equipped with a "digging ladder." The welded steel "ladder," weighing 17½ tons, is 75 ft. long and can dig to a depth of approximately 55 ft. below the surface of the water. The dredge is a complete sand and gravel plant capable of digging and preparing some 1,000,000 tons of aggregates annually and is being used on the Ohio River between Pittsburgh and East Liverpool, Ohio.

Feldspar Plant

CONSOLIDATED FELDSPAR CORP., Trenton, N. J., is producing 300 t.p.d. of silica sand in addition to feldspar at its Barkdale, Colo., plant, V. M. Matson, plant manager, has announced. Almost all of the feldspar produced at the plant is being used in the manufacture of better grade glass. Some of the by-product silica is being shipped for glass manufacture.

New Digging Ladder

OHIO RIVER SAND CO., Louisville, Ky., has contracted with the Dravo Corp., Pittsburgh, Penn., to construct a new digging ladder for the sand company's sand digger No. 4.

Lime Products Firm Plans Expansion

UNITED STATES LIME PRODUCTS CORP. will expand its operations at Henderson and Sloan, Nev., as much as 30 percent when natural gas is made available as a fuel in the area, Kennedy Ellsworth, executive vice-president, has announced. In addition the use of gas will enable the firm to manufacture a new product, as yet not disclosed, for the steel industry. Tonnage of finished products turned out at Henderson and Sloan averages approximately 4500 per month, which will increase to 6000 monthly, when gas is available, Mr. Ellsworth said. High rates for oil, being used exclusively as fuel at present, have hindered expansion to date.

$4,000,000 Cement Plant?

LEWISTON AREA DEVELOPMENT ASSOCIATION, INC., Lewiston, Idaho, has announced that a $4,000,000 cement plant will be constructed in the area. According to Thomas H. Palmer, secretary-treasurer, and William Bellows, financial agent for the development firm, $50,000 is being raised to purchase the plant site and complete engineering studies of mineral deposits. The company then will form a nucleus of a larger firm which will build the plant. Capacity will be 3000 bbl. of cement per day.

Furnishes Cement For Oregon Dam

PERMANENTE CEMENT CO., Oakland, Calif., has been granted a contract to supply approximately 1,200,000 bbl. of cement for Detroit Dam in Oregon. The company currently is supplying cement for McNary Dam on the Columbia River with the contract calling for delivery of approximately 700,000 bbl. this year. Deliveries to Detroit Dam on the North Santiam River, 100 miles southeast of Portland, will start in 1950.

Change of Address

DURLAND SAND CO. has announced that its business office now is located at Kingston Corners Building, Kingston, Penn.

Investigate Rutile Mine

A REPORT on the Magnet Cove Rutile Co. mine, Hot Springs County, Ark., has been placed in open file for public inspection by the U. S. Geological Survey. The Magnet Cove Rutile Co. pits are located on the northern edge of an elliptical basin-shaped area roughly three miles long and two miles wide. The pits have been excavated in the oxidized zone of highly weathered and altered volcanic agglomerate of the Upper Cretaceous (?) age. The report includes a geologic map of the area and an explanatory text.

Pavement Yardage

AWARDS of concrete pavement for the month of March and for the first three months of 1949 have been announced by the Portland Cement Association as follows:

	Square Yards Awarded During March, 1949	During 1st 3 Months, 1949
Roads	2,163,557	4,501,359
Streets and Alleys	1,079,169	2,375,847
Airports	58,891	136,317
Total	3,301,617	7,013,523

Sand and Gravel Plant Under Construction

JOHN PORTER, formerly of Granite Rock Co, Watsonville, Calif., has announced that a sand and gravel plant, to be known as Metz Aggregate Co., is being constructed at Metz, Calif. The new operation is being designed to handle a minimum of 15 carloads per day and will provide gravel for the Granite Construction Co. according to Mr. Porter, who is president of the Metz firm.

Coming Conventions

June 14-15, 1949—
National Agricultural Limestone Association, Mid-Summer Meeting, Hotel President, Kansas City, Mo.

June 27-July 1, 1949—
American Society for Testing Materials, 52nd Annual Meeting, Hotel Chalfonte-Haddon Hall, Atlantic City, N. J.

October 10-14, 1949—
American Society for Testing Materials, 1st National West Coast Meeting, Fairmont Hotel, San Francisco, Calif.

January 22, 1950—
National Sand and Gravel Association, 34th Annual Convention and Exhibit, Stevens Hotel, Chicago, Ill.

Week of January 22, 1950—
National Ready Mixed Concrete Association, 20th Annual Convention and Exhibit, Stevens Hotel, Chicago, Ill.

Week of January 29, 1950—
National Crushed Stone Association, 33rd Annual Convention and Exhibit, Stevens Hotel, Chicago, Ill.

Cement Imports

BELGIUM has resumed shipments of portland cement to the United States during the last few months for the first time since the end of the war, according to import trade sources. The cargoes are intended for consumption in areas along the Eastern seaboard because of the high costs of transportation from further inland. Prices are said to be well above domestic levels, but shipments are being channeled into areas of tight supply. Belgium's cement output rose from 1.9 million metric tons in 1946 to 2.6 million in 1947. Of the 1947 production, more than 1 million metric tons were exported. During the first half of 1948, Belgium mills turned out 1,680,000 metric tons. German cement, produced in the U. S. zone, also is being offered at Atlantic ports, another report states. Total German exports in July amounted to 402,347 bbl., with more on the way.

Progress in Road Construction

FEDERAL-AID FUNDS provided under the Federal-Aid Act have almost all been expended on new roads, according to Col. E. R. Needles, president, American Road Builders' Association. Out of a total authorization of $1,500,000,000, the sum of $1,425,394,287 has been expended for new highway construction completed or in the process of completion, indicating that states have matched the federal funds as required under the act.

British Columbia Rock Wool Plant

WESTERN INSULATION CO. has been organized in Vancouver, B. C., for the manufacture of rock wool insulation in a number of forms including granulated insulation and batts and blankets of rolled wool. When in full operation the plant will have a capacity of approximately 30 tons per day.

Awarded P.C.A. Safety Trophy

PITTSBURGH PLATE GLASS CO., Pittsburgh, Penn., has announced that its Columbia cement plant has been awarded the Portland Cement Association trophy for 1948, for completing the calendar year without a lost-time accident.

Erects Crushing Plant

ESSEX SAND & GRAVEL CO. has placed in operation a new stone crushing plant in West Peabody, Mass. The plant has a capacity of 100 t.p.h. of minus ¾-in. stone, most of which is used in the production of bituminous concrete. Drilling for blasting is done with wagon drills and jackhammers. Loading is by a 1½-cu. yd. shovel to trucks which haul from the quarry.

The company's washed sand and gravel plant that had been operated in the West Peabody location has been relocated and is now producing at Andover, Mass.

Asbestos Production

ASBESTOS cement building products, in heavy demand for postwar construction, should be in somewhat greater supply this year if the mining of raw asbestos continues the upward trend it showed in 1947, according to the Asbestos Cement Products Association. Both imports and domestic output of asbestos in 1947 were greater than in 1946. Imports totaled nearly 595,000 tons, compared with 456,000 tons the previous year, representing 96 percent of all asbestos used in the United States during the year. Ninety-one percent of that total came from Canada. Domestic production reached a record 25,000 tons, 74 percent more than the 14,400 tons mined in 1946.

Washington Limestone Deposits

RESULTS of an investigation of limestone deposits in western Washington made by the Bureau of Mines in 1946 have been made public in a new project report, "Report of Investigations 4393, Investigation of Limestone Deposits near Arlington, Snohomish County, Wash." Analyses of the 21 samples collected during the study showed that the deposits were of good commercial quality, containing from 54.8 to 55.5 percent calcium oxide. Topographic and assay maps are included. Copies of the report may be obtained free from the Bureau Publications Section, 4800 Forbes street, Pittsburgh 13, Penn.

Belgium Cement Statistics

SUBSTANTIAL PROGRESS was made in the cement industry in Belgium in 1947, according to an article in *Mineral Trade Notes*. Output of cement was 2,609,092 metric tons, compared with 1,889,777 tons in 1946. Exports of cement totaled 1,078,151 tons in 1947, with the Netherlands receiving about 20 to 30 thousand tons per month. Remainder of the cement is being exported to 30 other countries.

Plant Nears Completion

CONSTRUCTION of a large phosphate fertilizer plant at Wendell, Idaho, is nearing completion. The plant, which will produce treble superphosphate, is being built by Gates Bros., with the financial cooperation of the Idaho farm bureau federation.

Kiln Firing System Increases Tonnage

E. C. NOVELLO, Fabrica Nacional de Cemento, Guatemala, has reported that conversion of the former Keystone kiln to the Azbe system of firing and hot zone recirculation has resulted in a capacity of 41 short tons of burned lime per day with an average use of oil as fuel over a four month period of 34 gal. per ton of lime produced. This represents a fuel usage of approximately 5,000,000 B.t.u. per ton of lime. The kiln formerly was hand-fired with wood with a daily capacity of about 7 tons of lime.

Locate New Lime Marl Deposit in New Jersey

AN EASILY ACCESSIBLE deposit of 700,000 tons of lime marl suitable for agricultural purposes and which could supply farmers in the area for many years has been discovered near Vincentown in southern New Jersey. To date, New Jersey farmers have been importing some 50 percent of 200,000 tons of liming materials used each year, although there is said to be an almost unlimited supply of liming materials within the State.

Bentonite Production

PRODUCTION of bentonite rose to a new peak of 763,889 short tons valued at $5,949,586 in 1947, according to the Bureau of Mines, topping by 27 per cent the 1946 all-time high. The foundry and petroleum industries consumed 9/10 of the total tonnage. Other markets included filtering and decolorizing oils, rotary drilling mud, and foundry sand bond. The Wyoming-South Dakota area furnished 58 per cent of the total tonnage in 1947.

Canadian Gypsum

PRODUCTION of crude gypsum in Nova Scotia totaled 25,270 short tons in 1947, a substantial increase over 1946, as reported in *Mineral Trade Notes*. In 1947 two quarries of the Canadian Gypsum Co., Ltd., Windsor, were in steady operation, and a third quarry is being put into operation. National Gypsum Co., Ltd., which operates quarries at Dingwall and Walton, Nova Scotia, also increased production substantially in 1947.

C. of C. Member

CY. MIDDEKE, vice-president of the St. Charles Quarry Co., St. Charles, Mo., has been appointed a member of the St. Charles Chamber of Commerce.

Talc Mine Changes Hands

SIERRA TALC AND CLAY CO. has taken over the Lady Esther, Ltd., talc mine south of Lida, Nev.

HINTS and HELPS

PROFIT-MAKING IDEAS DEVELOPED BY OPERATING MEN

Repowering of locomotive crane enables it to be used in shifting railroad cars as well as in loading operations

Crane Power Converted

TYPICAL of power conversions in the rock products industry is the installation by Reading Sand Co., Penbryn, N. J., of a 150-hp., Model HIP-600 Cummins diesel on an Orton-Steinbrenner locomotive crane, originally powered by steam. Repowering has increased tractive effort so that the locomotive crane now can be used in shifting railroad cars as well as in loading operations, it has been reported. The crane can move ten loaded railroad cars at one time on a three percent grade.

Stacker Belt Storage System

STACKER BELTS are being employed for stacking final products at many plants throughout the United States. In several cases, after the equipment had been in service for some time, it was found that the stackers were too high and had to be lowered. In two of these instances, the outboard end was 100 ft. high, and in another it was 70 ft. high, and it was found that when stacking larger sized stone there was an excess of breakage due to the fall. It was been suggested that operators planning to use this system for building up storage piles bear this in mind.

On the other hand, when high stacker belts are required in order to make a large capacity stockpile, aggregate ladders frequently overcome difficulty caused by excess breakage due to too great a fall. Too often carefully graded stone is subject to rough handling after leaving the screening plant.

Hinged weights prevent "roll-back" of gravel. Note side guides on belt

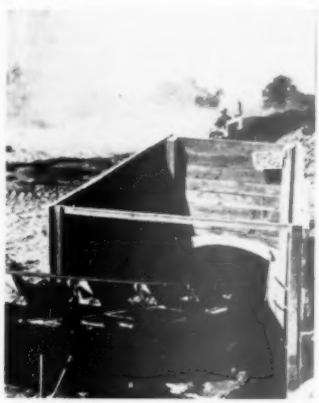
Weights on Conveyor Prevent "Roll-Back"

HINGED, VERTICAL WEIGHTS are being used on a steep belt conveyor to prevent "roll-back" of larger sizes of gravel at a Yuba dredge operation in the West. The dredge's digging ladder has 122 buckets, each of which hold 18 cu. ft. of sand and gravel. The gravel is well worn and round and, for the most part, relatively small, i.e., less than 10 in. in diameter. Occasionally, however, the buckets dig up gravel around 18 in. in diameter. As the material goes through the plant, these rejects are stacked on a 250-ft. belt mounted on the dredge. The belt rides on 8-in. Stephens Adamson carrier rolls.

The weights being used to prevent "roll-back" are so constructed that the oversize rock can go up the belt. If it rolls back, the one-way hinge prevents the gravel piece from going very far. Once the piece comes to rest on the belt, it usually goes to the waste pile without further trouble. The dredge is handling about 80,000 cu. yd. of material per week.

Unusual Reclaiming Tunnel

INLAND AGGREGATES Co., Niles, Calif., at its new plant is using a reclaiming tunnel constructed by the Gunite process. A simple skeleton was built and sprayed with Gunite concrete to form the tunnel, doing away with the usual wooden forms. Sand is kept in four piles over the tunnel for drainage purposes. In the illustration, an international tractor is dozing one of the piles over the reclaiming gate.



Gunite reclaiming tunnel

Stone Ladders

ALTHOUGH stone ladders are not new to crushed stone producers, it is surprising the number of operators that do not take advantage of this method of having the material itself

One of several stone ladders in the loading section of this plant

absorb the abrasion effect at points of impact. The two illustrations show how one company employed stone ladders for this purpose.

Stone ladder installed at end of the final sizing screens

Gold Recovery Riffles

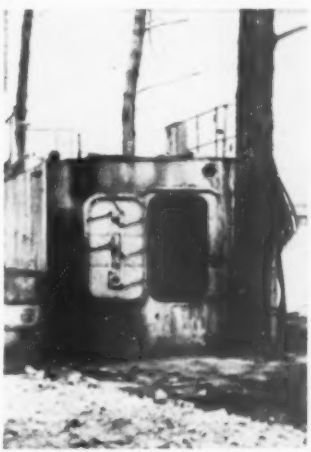
MANY SAND AND GRAVEL OPERATIONS recover gold in the washing operation, especially on the West Coast. Small amounts of gold also have been found in gravel in Alabama, Pennsylvania and Missouri. Recovery systems are simple and require no extra labor. Gold having a sp. gr. of 19.7, as compared to gravel at 2.6, will settle out behind any obstruction even when there is considerable turbulence.

Some of the gold recovery flumes, or "sluice boxes," on one of the Yuba dredges operating in California are shown in the illustration. Metal cross pieces have been placed in these flumes and the gold particles lodge behind them. From time to time, flow of the minus ½-in. material is diverted and the gravel with its high gold content is removed and concentrated further by amalgamation.

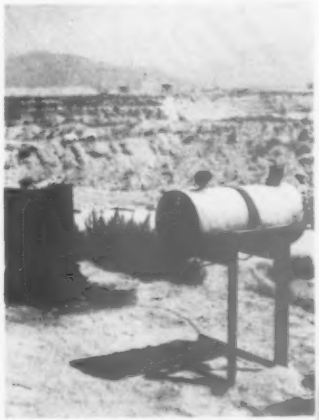
Gold recovery flumes

Store Room From Deck Structure

AT A CRUSHING PLANT in the South, deck housing from an old war-surplus LCT has been removed and is being used as a store room and small shop as shown in the illustration. A similar deck structure is being used as a powder magazine. The plant ships rip rap down the Congaree River below Columbia, S. C., on a total of 36 barges that haul from 150 to 700 tons of stone each. Five of the units are old CM's that have seen war service, and 13 are the LCT's from which the steel deck housings were obtained.



LCT deck structure becomes storeroom



Left: Zinc melting furnace in which melting ladle is placed. Right: Fuel supply tank

Zinc Melting Furnaces

TWO ZINC melting furnaces being used in the Southwest are illustrated herewith. The first, which uses oil as fuel, is in operation at a gravel plant that has four crushers. When new jaws are installed, the furnace comes in handy. The second illustration is an example of a more simple zinc melting furnace, also in operation at a gravel plant.

These furnaces are simple to set up and can be fabricated from waste material to be found around almost any operation. Furnaces for the melting of other metals can be constructed simply also.

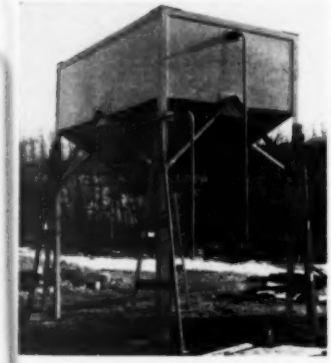
Simple zinc melting furnace

New Machinery

ROCK PRODUCTS

Aggregate Bins

NEW HOLLAND MANUFACTURING CO., Mountville, Penn., has started the manufacture of aggregate bins in the standard one-compartment, 21 cu. yd. straight and jack leg types and the 3-compartment, 21 cu. yd. unit. The

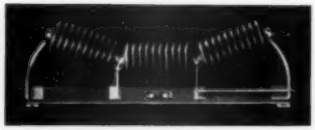


Three-compartment, 21-cu. yd. aggregate bin

one-compartment bin is 10 ft. sq. and the 3-compartment bin measures 8 x 12 ft. Overall height is 16 ft. Truck clearance under the bins is 8 ft.

Impact Idlers

CONTINENTAL GIN CO., Birmingham, Ala., has announced a patented rubber disc impact idler for troughed, flat and return belts. The idlers are interchangeable with most standard idlers now on the market. The company also has announced its hollow-center rubber



Impact idler

tired impact idlers for heavier installations, and special impact idlers for specific conditions. All idlers are equipped with anti-friction bearings.

Hopper Wagon

WOOLDRIDGE MANUFACTURING CO., Sunnyvale, Calif., is producing the Terra Cobra Wagon Model TC-W14, available complete with 200 hp. Terra Cobra Model TC Tractor, or as wagon unit Model W14 only. The wagon has been designed for quick interchange with scraper units on all models of Terra Cobra self-propelled scrapers.

With a heaped capacity of 20.0 cu. yd., and 14.0 struck, the tapered bottomless hopper can spot dump to the rear, or spread to the desired lift by moving back on roller tracks. Positive fore and aft motion of body is effected by air controlled cables reeved without reverse bends in such a manner as never to contact load, the producer states. The cable is accessible at all times.

The hopper, which is said to pass rock up to 48 in. dia., and stationary chassis bottomplate ore made of heavy abrasion resistant alloy steel. Rear wheel brakes operative from two air reservoirs on the wagon, are set automatically if air supply from the tractor is interrupted.

Cable controlled hopper rolls back to spread or dump to rear

Rock Drill

WARSOP POWER TOOLS, INC., Philadelphia, Penn., is producing the Warsop Rock Drill, built to withstand prolonged and arduous work with normal

Rock drill which may be operated in any position—vertical to almost horizontal

attention necessary to its efficient running as would be given to any gasoline driven engine.

A feature of the unit is that it may be operated in any position from the vertical to almost horizontal. As stated by the manufacturer, the drill derives its power from a two-stroke internal combustion engine, mounted in an inverted position; the customary cylinder head is replaced by a further cylinder and piston—the hammer unit; the explosion taking place between these two pistons drives the hammer piston directly on to the shank of the tool at the rate of some 2200 blows per min.; the return of the hammer piston to the striking posi-

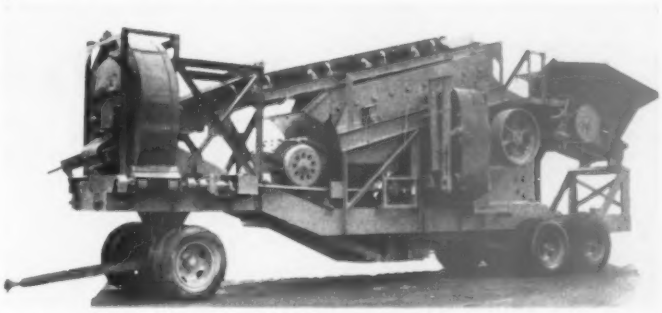
tion is by means of by-passed gases, without the aid of springs, etc.; and the same action rotates the drill, while clearance of the dust accumulation from the hole is effected by the gases delivered under pressure through the drill steel while the machine is in operation. Ignition is by flywheel magneto and standard spark plug and the machine is cooled by a fan mounted on each end of the crankshaft. Lubrication is automatic through oil being mixed with the gasoline in the ratio of one part of oil to sixteen parts of gasoline.

Combination Dragline, Shovel, Clamshell, Crane

SCHIELD BANTAM CO., INC., Waverly, Iowa, has announced the improved Bantam, Model M-49, a truck mounted unit combining six machines in one with interchangeable booms and buckets. It can be converted from shovel to trench hoe, dragline, clamshell, pile-driver, or crane, and mounts on any 1½ ton or larger truck chassis, and also is available on half-tracks. It is offered with an independent spur gear drive boom hoist which permits the boom to be powered up or down, or lowered on the brake for fast operation.

Engineering features listed by the company include Timken tapered roller bearing mounting of jack, drum and swing shafts; drums, swing gears, and vertical swing shaft roll on prelubricated, sealed ball bearings; sealed-in triple roller chain drive which runs in an oil bath; machine cut gears and pinions and flame hardened parts; internal expanding mechanical clutches on both swing and drum shafts; and a new cab design with improved visibility and simplified controls.

The Bantam has a capacity of 60 cu. yd. per hr. when used as a shovel or dragline, and crane capacity is 5 ton. The trench hoe will dig 100 feet of 5-ft. ditch per hr.

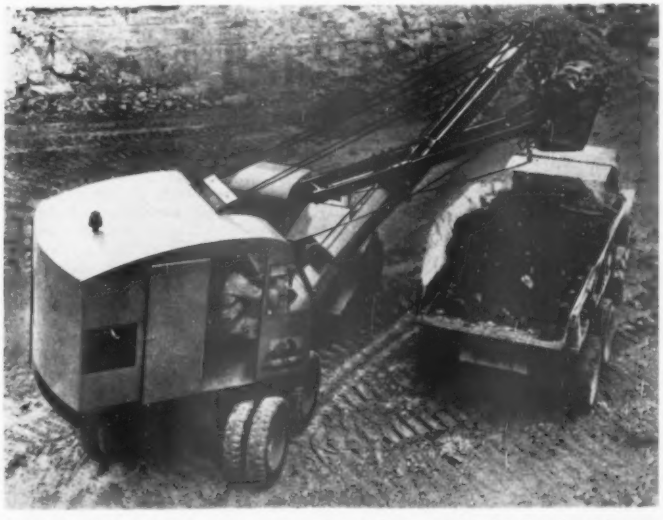


Portable crushing plant with jaw crusher, hammermill and gyrating screen mounted on a single chassis

One-Unit Crushing Plant

UNIVERSAL ENGINEERING CORP., Cedar Rapids, Iowa., has announced a new high capacity one-unit portable outfit said to do the work of two single crusher units. Designed to meet the need for a combination plant for road rock, stone chips and agstone, the crusher is an arrangement of three primary components—the Universal roller bearing jaw crusher, the Universal roller bearing hammermill, and the Universal Simplicity gyrating screen. These components, together with clutch controlled folding conveyors, rotovator and necessary driving connections, are all mounted on a single chassis. The plant is shovel fed. Provision has been made for powering the hammermill separately so as to permit a variable speed to suit the operation to the nature of rock being crushed and the kind of finished product desired. The rest of the plant is driven from the crusher. Power is transmitted to the hammermill and crusher through special countershafts and joint connections. The hammermill will receive up to 5-in. stone; the jaw crusher may be set to whatever size is needed for proper balance with the hammermill; and the three deck gyrating screen with gates at the discharge end, grades the crushed stone into one, two or three sizes.

The screen is equipped with a ball tray which is said to act as a fourth deck with coarse mesh wire. The tray is divided into multiple compartments, each carrying several rubber balls. The gyrating motion of the screen causes these balls to beat against the bottom deck, thus keeping the openings clear for top screening efficiency.



Interchangeable booms and buckets permits machine to be converted to dragline, clamshell, crane and other units

Combination Pump

PACIFIC MILL & MINE SUPPLY CO., Fresno, Calif., has announced a new 3-in. combination suction, pressure and volume water pump which will take aggregate up to 2½ in. in size and will pump approximately 10 cu. yd. per hr. of any type gravel. The company also manufactures 2-in. and 4-in. pumps.

Time-in-Process Recorder

THE BRISTOL CO., Waterbury, Conn., has developed an instrument for recording time-in-process, giving a reading on a uniform scale and chart of rate of conveyor movement, directly in terms of the total time consumed by work in traveling through a process. No calculating is required.

Simultaneous Manufacture Of Cement and Cast Iron

By DR. K. KOYANAGI*

THE BASSETT PROCESS of making iron and cement clinker simultaneously was first put in practice by a Spanish portland cement company "Asland" from 1931 to 1935. The company set up one 9- x 140-ft. rotary kiln for this purpose and, after the solution of various problems, succeeded in producing 60 to 80 tons of cast iron and 60 to 80 tons clinker daily. The manufacturing process was briefly described at that time but nothing has been reported on the quality of the cast iron and cement as manufactured.

*Japan Cement Engineering Association.

	Ig. loss	SiO_2	Al_2O_3	Fe_2O_3	Fe	CaO	MgO	S	P	Cu
Limestone	43.20	0.57		0.81	—	54.37	0.78	—	—	—
Pyrite cinder	4.50	9.64	3.90	—	54.89	0.30	0.27	2.63	0.30	0.89
Pyrite cinder	4.09	12.21	4.13	—	52.09	—	0.55	1.83	0.038	0.88
Pyrite cinder	7.10	11.24	4.16	—	54.25	1.36	1.14	1.02	0.030	0.71
Hematite	2.04	6.28	2.56	—	60.40	—	0.42	—	0.014	0.007
Hematite	1.75	5.28	2.37	—	61.68	0.33	0.69	0.02	0.120	0.008

Table I: Chemical analyses of raw materials

	Moist.	volatile matter	fixed carbon	ash	Chemical analysis of ash SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	SO_3
Coke	1.47	4.81	73.53	20.19	42.10	26.66	16.54	7.30	1.91	3.43
Anthracite	4.70	6.85	77.41	11.02	53.13	25.60	12.90	2.72	1.06	0.19
Coalite	15.40	12.61	35.64	36.35	50.09	19.82	11.27	7.98	—	4.80

Table II: Composition of reducing agents

No.	Moist.	volatile matter	fixed carbon	ash	calories	Chemical analysis of ash SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	SO_3
1	2.13	40.26	45.23	12.38	7137	47.18	28.15	5.40	9.99	2.33	3.94
2	2.94	37.76	49.01	10.29	7327	53.17	30.82	7.96	3.43	1.24	2.24
3	1.59	37.86	51.01	9.45	7729	40.59	26.63	5.75	17.02	4.42	4.85
4	1.87	38.12	48.24	11.77	7203	48.70	29.65	5.83	6.72	2.71	3.26

Table III: Analyses of coal for firing

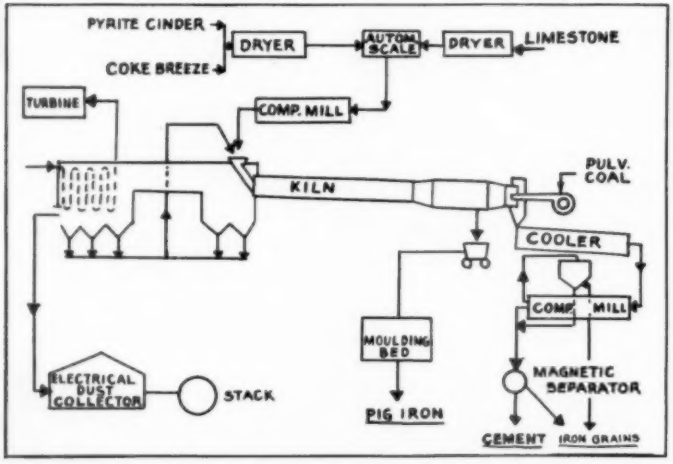


Fig. 1: Flowsheet for the simultaneous manufacture of cement and cast iron

During the war, the process was tried by three of the largest cement plants in Japan on a far larger scale than in Spain, and both iron and cement of good quality were obtained.

The sizes of rotary kilns equipped for the process by these plants were as follows:

Plant A—One 9- x 10- x 180 ft. kiln.
Plant C—One 10.5- x 11.5- x 200-ft. kiln.
Plant O—One 10.9- x 11.5- x 243-ft. kiln.

The kilns were all modernly equipped and have waste heat boilers and Cottrell electric dust collectors.

The author directed the operation of the process in one of the plants as chief chemist, and, based on his experience, reports herein on the operation and the properties of the manufactured products. The plant had six rotary kilns, four of which were equipped with Unax coolers and the other two with rotary coolers. One of the kilns with a rotary cooler was equipped for the process. Size of the kiln was 10.5 x 11.5 x 200 ft. Its slope was 4.7 percent and its speed was 0.5 to 1.0 r.p.m. at first after which it was 0.3 to 0.6 r.p.m.

Raw Materials

Pyrite cinder was the chief source of raw material for iron For some time, hematite ore of much lower copper content was used to determine the effect of copper in the ore on the composition of the cast iron produced. As reducing agents, chiefly coke breeze, anthracite and, in some rare cases, coalite were used. A hard limestone of 99.6 percent $CaCO_3$ was used and bituminous coals were used as fuel. Chemical analyses of the raw materials, reducing agents and coals used are given in Tables I, II and III, respectively.

Determination of the proper mixing proportion of raw materials for this process is much more complicated than in the case of ordinary portland cement. The mix must be so regulated that the iron oxide is completely reduced to metallic iron and at the same time the slag must retain a composition such as to show high hydraulic power. Many tests had to be carried out before we reached the mixing proportions most favorable to the production of both cast iron and cement. The proportions are 100 parts of pyrite cinder, 120 to 130 parts limestone, and 60 to 70 parts coke breeze.

Operation

The raw grind was prepared by mixing pyrite cinder and coke breeze which, after drying in a dryer, were weighed together with limestone by means of a poidmeter and fed into a compartment mill to be ground to a fineness of 90-95 percent through a 200-mesh sieve. If the raw material is fed into the kiln in a powdered state, the coke powder, which is lighter than the other components, is blown out by the kiln draft and results in a shortage of reducing agent. So, it is better to granulate or make briquettes before feeding to the kiln. The burning operation is similar to that for ordinary portland cement. It must be done with a full oxidizing flame. With a reducing flame, the temperature in the kiln cannot be raised high enough to melt the iron in the melting zone. The iron flowing through the discharge hole is allowed to flow into the pan track beneath the kiln, and is brought to the sand bed for moulding. The clinker, after cooling, is ground into cement in a compound mill in simple circuit with an air separator. The material contains some iron grains, about one-half of which is removed in the air separator and the remainder must be separated by magnetic separator. The general plan of operation is illustrated in Fig. 1.

Kilns

In order to adapt the cement kiln to the process, it was necessary to make certain installations in part of the melting zone. Among the most important special changes were the following:

1) Building a dam ring in the kiln at the outlet.
2) Making discharge holes in the kiln shell at the melting zone.
3) Water cooling arrangement on the outside of the kiln shell.
4) Installing a scraper to remove the clinker coating on the dam ring.

As shown in Fig. 2, a dam ring 1.4 ft. high and 4 ft. wide was built with brick, 14.5 ft. from the kiln outlet, to hold the molten iron back in the melting zone. At the deepest point of the melting zone, 22 ft. from the discharge end, discharge holes for molten iron were made through the kiln shell, into which a block made of electrode carbon, with a hole of 1¾ in. in diameter was inserted, to protect the hole from the corrosive action of molten iron. The number of discharge holes was increased from two to four, two for regular use and the others for reserve. Those not in use are temporarily plugged with a mixture of graphite and clay.

The kiln shell at the melting zone must be cooled from the outside by means of a water spray. If the cooling is not sufficient or is non-uniform, then the molten iron which creeps through crevices of the brick makes holes instantaneously upon touching the kiln plate.

The clinker, which always contains metallic iron in varying amounts, is very adhesive and easily forms a hard coating on the dam ring, so it must be continuously scraped off before cooling.

Among the fire brick used for lining the melting zone, cement-clinker brick were most effective. In another plant magnesia brick were used, which gave the best results. They held up about one month.

The burning operation requires great care and considerable skill. It is important to control the burning so that the carbon percentage of the cast iron falls between 4 and 4.5 percent (near the eutectic of the cast iron diagram). If the carbon content in the iron is less, the discharge hole is easily stopped up by the solidifying iron and is extremely difficult to clear away.

Many burning tests with various kinds and mixing proportions of raw materials were tried out. After solving numerous operating problems, a daily production of 60 to 70 tons of iron and 100 to 120 tons of clinker, was attained but the process was stopped, after test work of one year, for lack of bituminous coal for burning.

Test Data

Testing was carried out with thousands of cast iron and cement samples. The results given in the following tables are mean values of many tests.

When pyrite cinder is used as raw material, the cast iron obtained in normal operation is mostly in the form of gray iron, changing into a white pig when the operation is a little unfavorable. The chemical compositions of cast iron products are given in Table 4. In the table, test Nos. 1 to 5 are the analyses of cast iron obtained from raw mixtures using pyrite cinder and coke breeze in various mix proportions. No. 6 and No. 7 are those obtained from hematite and coke breeze; No. 8 are those from a mixture of pyrite cinder and hematite.

No. of burning test	Kind of ore	Number of test pieces	Chemical analysis C	Si	Mn	P	S	Cu
1	pyrite cinder	24	3.67	0.08	0.04	0.047	0.129	1.404
2	pyrite cinder	135	4.43	0.05	0.12	0.087	0.013	1.133
3	pyrite cinder	201	4.19	0.06	0.10	0.069	0.010	0.900
4	pyrite cinder	198	4.43	0.05	0.09	0.079	0.009	1.135
5	pyrite cinder	189	4.37	0.08	0.04	0.073	0.005	1.254
6	Hematite	166	4.38	0.06	0.08	0.202	0.004	0.067
7	Hematite	98	4.44	0.06	0.10	0.142	0.003	0.073
8	Mixt. of Hematite and pyrite cinder	10	4.67	0.04	0.05	0.100	0.003	0.501

Table IV: Chemical analyses of cast iron

From this table it can be seen that cast iron produced by the Basset process is very low in silicon, manganese, phosphorus and sulphur. It contains 1 to 1.4 percent copper, when pyrite cinder is used as raw material. It was also found by another test that the nitrogen content of the iron is much lower than for blast furnace pig iron and about the same as for charcoal iron of best quality.

Chemical analyses of the iron grains separated from the cement are given in Table 5. The analyses in the table show that the iron grains separated from the cement are much lower in carbon content than for the cast iron.

Size of grain	Percentage after melting Iron	Slag	Chemical analysis C	Si	Mn	P	S	Cu
5 to 10 mesh	89.2	10.8	0.58	0.03	0.03	0.020	0.066	1.000
10 to 20 mesh	86.1	13.9	0.83	0.03	0.03	0.026	0.056	1.004
Under 20 mesh	75.9	24.1	1.34	0.10	0.03	0.042	0.071	1.004
Mean sample	86.4	13.6	0.76	0.03	0.03	0.025	0.080	1.004

Table V: Chemical analyses of iron grains separated from the cement

As stated earlier, the clinker obtained by this process always contains some iron grains which must be separated out. Complete separation by magnetic separator is difficult because the fine powder in the cement reacts as an insulator between the iron grains and the magnet. As a result, a comparatively large quantity of metallic iron remains in the finished cement which has some bearing on the quality of the cement and also reduces the output of cast iron. In Table 6, chemical analyses of the cement and the percentage of iron grains separated from the cement are given.

(Continued on page 62)

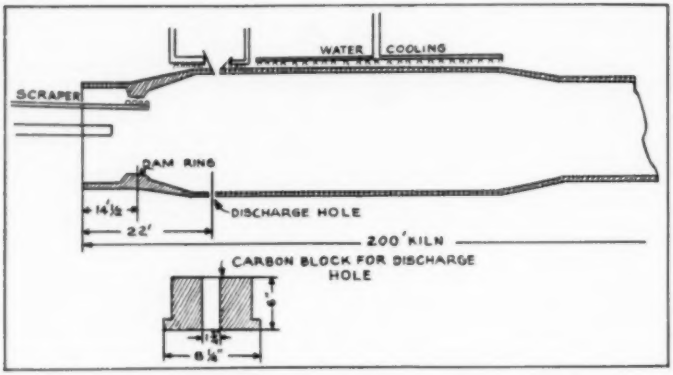


Fig. 2: Sketch showing installations made to adapt cement kiln to simultaneous manufacture of cement and cast iron

No. of burning test	Number of testing samples	Percent of sep. iron grains	Chemical analysis					
			SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	SO_3
1	5	not det.	20.91	9.07	9.30	58.58	1.77	1.83
2	29	22.4	18.07	8.52	10.87	60.96	1.75	3.31
3	19	27.8	19.47	8.33	10.49	60.35	2.03	3.17
4	27	22.2	20.16	7.81	8.89	61.19	1.78	1.98
5	12	24.8	22.72	8.09	5.78	60.29	2.01	2.64
6	18	28.1	20.67	9.13	5.88	62.74	1.50	1.47
7	18	27.2	21.39	9.09	5.89	62.68	1.54	1.66
8	18	17.0	22.02	9.46	5.72	60.58	1.96	3.06

Table VI: Chemical analyses of cement

No. of burning test	Number of testing samples	Fineness residue 4900/cm² (%)	Setting time		Soundness boiling test	Tensile strength		Compressive strength	
			Initial	Final		7 days Kg/cm²	28 days Kg/cm²	7 days Kg/cm²	28 days Kg/cm²
1	5	2.00	3h 01m	4h 22m	OK	15.0	26.5	177.0	293.7
2	29	2.00	3h 11m	4h 33m	OK	22.8	35.6	309.7	414.2
3	19	2.11	5h 29m	4h 55m	OK	24.6	34.9	289.6	417.6
4	27	1.92	3h 55m	5h 27m	OK	25.7	35.6	308.4	425.7
5	12	2.01	3h 49m	4h 33m	OK	18.1	29.0	166.2	276.5
6	18	1.81	4h 02m	5h 18m	OK	26.9	33.6	271.8	362.1
7	18	1.92	2h 42m	3h 28m	OK	27.0	34.7	328.0	460.9
8	18	2.20	1h 53m	2h 48m	OK	20.9	34.2	213.3	383.2
JES NO. 28		max.	min.	max.		min.	min.	min.	min.
		12	1h 00m	10h 00m	OK	20	25	220	300

Table VII: Test results for fineness, setting time, soundness and strength in comparison with Japanese Engineering Standard JES No. 28

In Table 7 the test results for fineness, setting time, soundness and strength in comparison with Japanese Engineering Standard JES No. 28 are given.

The cement, although it contains a comparatively large quantity of metallic iron, shows a normal setting time and quite good strength. It was used in great quantities in constructing a swimming pool at the factory and gave complete satisfaction. As to the constitution of the cement clinker, a minute examination by means of microscope and X-ray was carried out, on which a report will be given later.

Opens Limestone Plant

LUNDIN CONSTRUCTION CO. has set up an agricultural limestone plant at Mankato, Minn.

Tests and Specifications for Aggregates

THE AMERICAN SOCIETY for Testing Materials has recently published two booklets* that should be a must for producers of commercial aggregates. The first is a summary of all the present standards, including portland cement as well as paving brick, granite block, calcium chloride, mineral fillers for bituminous pavements, etc., but not bituminous binders or cements.

This new compilation is the work of Committee C-9 on Concrete and Concrete Aggregates and Committee D-4 on Road and Paving Materials. There are altogether 71 specifications, test methods, etc. There are ten specifications for concrete aggregates; 18 methods of test; and six definitions. There are 17 specifications, methods of test, and definitions covering concrete. Four specifications cover cement; and there are seven specifications for brick and block pavement materials. Also included are several miscellaneous specifications and tests.

The second booklet is a collection of papers and discussions by specialists in each subject as presented at the 1948 convention in Detroit and briefly summarized in our report of the meeting in the August issue of ROCK PRODUCTS.

This symposium is devoted to presentation and discussion of a group of papers dealing with the distribution, characteristics and uses of mineral aggregates. The papers are written primarily for those groups of individuals interested in the characteristics and uses of mineral aggregates who normally are not intimately connected with the aspects of research and testing. For purposes of the symposium, mineral aggregate is defined as "Mineral Aggregate—An Aggregation of sand, gravel, crushed stone, slag, or other material of mineral composition, used in combination with a binding medium to form bituminous and portland-cement concrete, macadam, mastic, mortar, plaster, etc., or alone as in railroad ballast, filter beds and various manufacturing processes, such as fluxing, etc." It is to be noted that the concept embodied in the use of the term "aggregate" as presented in this definition is much more inclusive than that of either of the present A.S.T.M. definitions. . . .

The enormous demand during and following the recent World War for mineral aggregates as a material of construction has focused attention on the need for complete and up-to-date general knowledge of the characteristics of these materials.

Even though the scope of this symposium is enlarged considerably over that presented in 1929, there are many subjects which have been touched upon only lightly. In contrast, many of the papers contain extensive bibliographies—ranging from 10 to as many as 159 references. Historical background has been presented where it is indicated that this phase of the subject is important in evaluating current practices. The papers may be grouped into six general categories including: (1) Distribution, Processing, and Sampling; (2) Tests and Mineralogical Characteristics; (3)

(Continued on page 98)

*A.S.T.M. Standards on Mineral Aggregates, Concrete, and Bituminous Highway Materials—Specifications, Methods of Testing, Definitions, September, 1948, 190 pp. $2.50, American Society for Testing Materials, 1916 Race St., Philadelphia, Penn.

Symposium on Mineral Aggregates, Technical Publication No. 83 (1948), 240 pp., $3.00. Same address as above.

To the extreme right is the primary crushing plant; large building, center, houses the screening and final reduction section; while to the left is the final screening and loading plant. Material may be loaded either to trucks or to railroad cars

Modern Slag Processing Plant

Extensive use made of magnetic separators in plant of American Materials Corp., New Miami, Ohio, to remove iron bearing-materials. Fines have many new applications in the manufacture of glass and for soil conditioning

THE NEW SLAG processing plant of American Materials Corp. near Hamilton, Ohio, has many new and novel features that make it one of the most modern plants of its kind in the United States. It is located at New Miami, Ohio which is about three miles north of Hamilton. The new plant replaces an older one now being dismantled that has been in operation there for many years. The operation of the plant is under the management of the American Aggregates Corp., but is owned jointly by that company and the France Stone Co.

George D. Scheuneman, plant manager

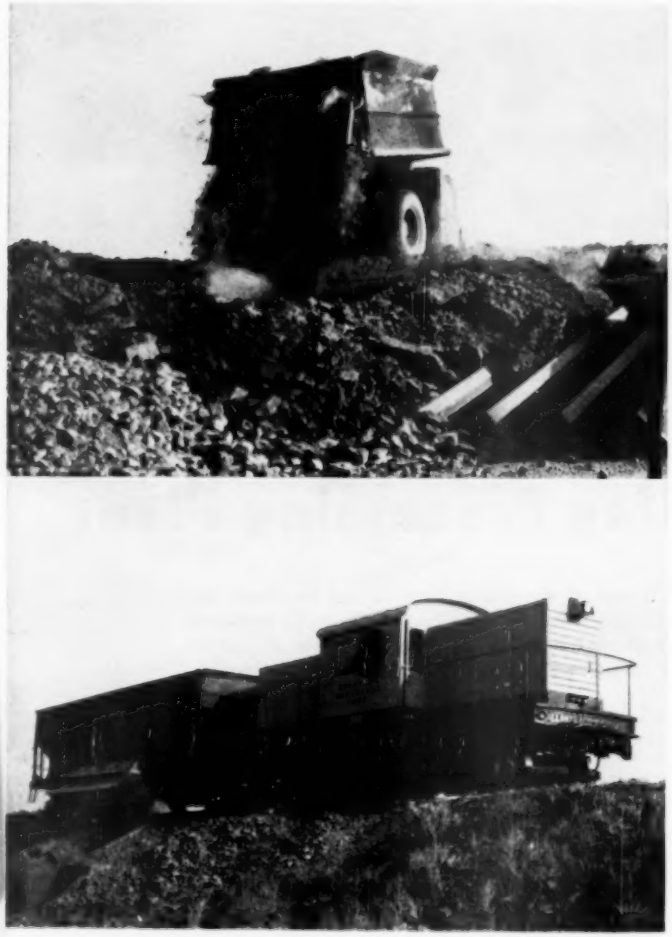
Slag Wool

There have been many new uses found for slag during the past years. Besides being used as a concrete aggregate, railroad ballast, road stone and other more conventional uses, slag, especially in the finer sizes, is finding wider usage as a soil conditioner and neutralizer for acid soils. Through extensive researches it has been found that slag, which is a highly complex material, contains many ingredients that the soils need. Slag, besides having a neutralizing power of 73 to 94 percent, in terms of calcium carbonate, contains such elements as boron, manganese, magnesium, iron, and traces of many other elements that are required in various amounts by most vegetable life, and a considerable tonnage of the dust (formerly wasted) along with minus 8-mesh materials is going out from this plant to the farmers.

The growth of the slag wool insulation industry is also reflected in this company's operation for a considerable tonnage is going out for that purpose. Even the glass industry is using American Materials Corporation's slag, of which more will be said later.

No. 1 furnace of the Armco Steel Corporation operated for many years at the site and supplied the raw material for the older slag plant. During the last war furnace No. 2 was started by the steel company and the need for a larger slag crushing and screening plant was soon apparent. The new plant went into operation during 1948 and has a capacity of 200 to 300 t.p.h. depending upon size gradations.

The new plant features a very extensive use of magnetic separators to remove the metallic iron from the materials. The magnetic treatment of the slag starts at the primary track hopper and extends through the various crushing and screening stages and eventually the finer sizes in the ¼-in. to 16-mesh sizes are treated magnetically so that slag for a wide variety of uses may be obtained. The reduction of the iron content of some of the slag sizes has been developed to a degree that a considerable tonnage of slag is sold for glass manufacturing purposes, especially for the production of amber glass. In the manufacture of amber glass, it was pointed out, it is the practice to add iron sulphide and sulphur to the glass melt to



Top: one of six 8-ton trucks that are used to haul slag from furnace No. 1 to the processing plant. Bottom: side-dump cars are controlled from the cab of the haulage unit, which was built by a subsidiary of the parent company

get the color desired. This involved a mixing problem for it was not easy to always get a good blend in the melting furnace. With slag as the basic raw material, the composition is such that properly colored glass is more easily obtained. Incidentally, a Mexican glass manufacturer, touring the States saw, at a glass plant, how advantageous it was to use slag for this purpose, and several carloads were sent from Hamilton, Ohio to his glass plant South of Mexico City.

Another feature of the plant is the extensive use of dust collectors throughout the crushing and screening operations. Owing to the newness of the plant and to the problems encountered, the installation of dust collecting equipment is, at this writing, still going forward. The dust collectors were all supplied by Kirk and Blum of Cincinnati, Ohio. This company has for years made a specialty of installing dust collector equipment for many of the standard dust collector manufacturers and the installation at the slag plant of the American Materials Corp. is one of its first ventures into marketing a collector of its own design. The collectors are of the cyclonic type and are handling 65,000 c.f.m. of air. On one test, 99.4 percent of the dust was collected. At present there are nine of the cyclones in use, three of which are in the primary crushing section and the other six in the final screening and crushing plant. All use Sturtevant fans as a part of the dust collecting set-up.

The plant can be divided up into three sections for purposes of description. Each section is housed separately. First, is the primary and secondary crushing plant. Here two reductions are made using as a primary crusher a 24 by 48-in. McLanahan single roll crusher and a 6-K, Gates (Allis-Chalmers) secondary crusher with Allis-Chalmers Ripl-flo screens and a Symons vibrating screen for sizing. The intent here is to crush and size and to treat the separated products on magnetic separators, or magnetic pulleys, so that the large iron particles can be recovered before the slag passes to the recrushers and final screening plant. The second section is the main screening plant where the slag aggregates are sized and recrushed in two types of crushers with products magnetically treated including the minus 16-mesh materials. The third stage is loading facilities. This third division can be considered two parts: loading of dust, and loading of the coarser aggregate sizes. For box car loading, a Stevens-Adamson loader is used and with it a box car can be loaded in about one hour. For covered hoppers, the fine sizes are loaded from a Rex elevator via a metal spout. For the coarse sizes, a separate steel structure is provided that has two 4- x 8-ft. double deck Simplicity screens mounted high in the structure. The top deck of this screen is a wear-taker, and the lower is ¼ in. as the intention is to remove all fines from the material as loaded. The plant normally operates dry but ballast and slag for rock wool manufacture can be washed, if necessary. The screens are mounted above 8 steel bins with two driveways below for trucks and a side track for car loading. There is storage capacity here for 1200 tons of slag. Above and below the loading tipple is sufficient trackage to hold 40 empties and/or loads and all cars are handled by gravity.

Slag Haulage

Slag from the pits that were operated in connection with No. 1 furnace is being hauled to the new plant by a fleet of six E. H. Mack trucks that carry eight tons per trip. The haul is about one and one-quarter miles. The trucks are loaded by a Marion 37 electric shovel that has a 1¾ cu. yd. bucket.

For No. 2 furnace there are two pits, each 75-ft. by 1500-ft. long and which hold a total of 100,000 tons of material. These pits are filled by ladles that are hauled to the site over standard gauge rails. With two pits, one is being filled while the other is being reclaimed. The reclaimed slag is loaded by a 1¾-cu. yd., Bucyrus-Erie 50-B electric shovel. This unit is is to be replaced during the winter of 1948-1949 by an 80-B, Bucyrus-Erie shovel that will handle 2½ cu. yd. The shovel loads to a 50-ton capacity, side-dump car that was made by the

Greenville Mfg. Co., a subsidiary of the American Aggregates Corporation. This dump car is cab-controlled and is hauled by a diesel-electric engine that was likewise fabricated in the company's shops. It features a Cummins diesel and a General Electric generator. The haul is only a short distance; possibly 300 yd. It makes a round trip about every 18 min.

First Magnetic Treatment

The 50-ton car and the trucks all dump to a 150-ton steel hopper that has a steel grizzly over the hopper spaced on 16-in. centers. A Byers crane with a 42-in. Cutler-Hammer stationary type magnet removes any large iron pieces off the grizzly and at the same time helps work the materials through the open spaces. The magnet casts the iron chunks to a hopper conveniently near so that the metal can be returned to the furnaces. This is the first of many magnetic treatments that the slag gets before it all goes through the plant.

Under the track hopper are three large capacity feeders. These have 4- x 4-ft. openings and are of the reciprocating type and all discharge to a long 481-in. Jeffrey pan conveyor. At the loading points, the pan conveyor is practically flat but as it emerges from below the track hopper it inclines upwards so as to dump to the McLanahan & Stone crusher. The 42-in. stationary magnet on the crane can work over the material on this pan and pick out the larger chunks of metallic iron and cast them into the adjacent bin.

The single roll crusher is set to deliver a 4-in. product but can deliver up to 7-in. material. It discharges to a 24-in. Greenville, supercapacity bucket elevator that operates on about 42-ft. centers. It discharges to a 4- x 10-ft.

S. B. McCabe, slag plant superintendent, standing beside car-loader that handles finer material which is shipped in box cars

single-deck, dry, Symons vibrating screen that has 3-in. deck openings. The plus 3-in. minus 7-in. (approximate) falls to a short belt conveyor that has a 36- x 54-in. Dings Magnetic head pulley and discharges onto a 5- x 12-ft. Ripl-flo, Allis-Chalmers, double-deck dry vibrating screen with 4- and 3-in. deck openings, respectively. The oversize from one or both decks can fall to a 6K Gates Allis-Chalmers gyratory crusher with the crusher discharging back to the 24-in. pitch elevator.

The throughs from the first mentioned Symons screen and the throughs from the Ripl-flo screen join and pass over a 24- x 48-in. Dings magnetic separator which also delivers the material to a large capacity bucket elevator. This is an inclined elevator, 24-in. pitch, and it lifts the material vertically about 62 ft. and carries it horizontally 85½ ft. It operates at 50 f.p.m. and delivers all the combined products to the final screening and reduction plant that is alongside the primary section, and in a separate building. The dust collected from the three dust collectors mounted outside the primary plant also discharges to this supercapacity elevator so that the fines can be more easily handled during the later screening and magnetic treatments.

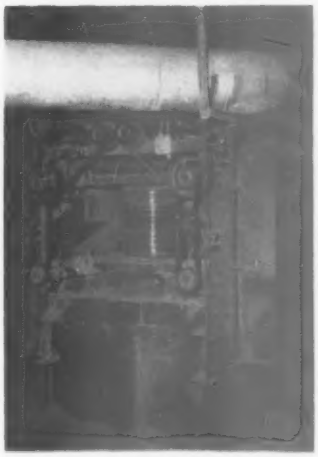
Screening Plant Details

The main screening plant can be divided into two sections. One prepares slag sizes from 4 in. down to 8 mesh and the other prepares materials from 8 mesh down to dust. In the first mentioned section the sizes given below are prepared and carried either in open storage piles or in silos with the arrangement so designed that the larger sizes can be reclaimed from a tunnel and sent back to the primary section via a belt conveyor system, or, all the sizes can be reclaimed by a tunnel belt and sent in the opposite direction to the loading tipple. And finally many sizes can be recrushed in two 4-ft. Symons short-head crushers that operate in conjunction with a recirculating elevator so that the material can be rescreened and again passed over a magnetic separator.

The following sizes are prepared and stored as indicated:

Minus	*Plus*	
4-in.	2⅞-in.	open storage
2⅞-in.	1¾-in.	open storage
1¾-in.	1⅛-in.	silo storage
1¾-in.	⅞-in.	open storage (ballast)
⅞-in.		open storage
⅞-in.	7/16-in.	silo storage
7/16-in.	¼-in.	silo storage
¼-in.	8-mesh	silo storage

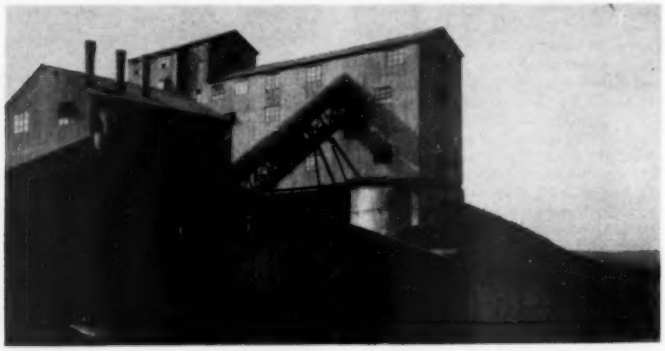
This part of the plant consists essentially of four silos arranged in a straight line but of variable distances apart. Over these four silos are built the main elements of the screening plant, which in more detail is as follows: The inclined 24-in. pitch bucket elevator from the primary crushing plant discharges its load to a 5- x 10-ft., three deck, Allis-Chalmers, low-head screen that normally uses two decks. They are 2⅞ in. and 1¾ in. respectively. The materials from the two decks can go their separate ways via spouts to open storage piles previously mentioned. The undersize from the low-head falls to an inclined, 30-in. belt conveyor that has a slope length of about 99-ft. with a vertical lift of approximately 31 ft. This conveyor is provided with a 36- x 50-in. Dings magnetic head pulley. By an arrangement of spouts and flop-gates at the low-head screen, plus materials from one or both decks can also go up this belt. And, the Symons cone crusher products return to this belt via a circulating bucket elevator.



Magnetic separators such as this are used throughout the plant to reduce the iron content of the finished product

Material Flow

The 30-in. inclined belt delivers to a 5- x 12-ft., three-deck, low-head, Allis-Chalmers vibrating screen that has 1¾-in., 1⅛-in., and ⅞-in. wire respectively. By an arrangement of suitable gates and spouts a 1¾-in., ⅞-in. material can be spouted to ground storage for ballast. Or, the plus products of the three decks can be sent to the short heads for a further reduction. The minus ⅞-in. material splits and is divided between two, 3 x 10-ft. three-deck, low-head, Allis-Chalmers screens that have 7/16-in., ¼-in. and 8-mesh wire respectively. The minus 8-mesh material is carried on a belt to the section of the plant devoted to the treatment of fine sizes. The three plus materials from the decks are either spouted direct to silos or are conveyed there by one of three, horizontally operated, 24-in. belts that are erected directly over the silos.



In the background is the final crushing and sizing plant. Conveyor from tunnel returns stockpiled material to the plant for re-crushing. Note three dust collectors on side of building in foreground

The silos have an inside diameter of 24 ft. and are 31-ft., 6-in. high. Starting at the end nearest the loading tipple, the storage facilities consist of roughly 24 ft. of open storage for the largest size, then a silo followed by 30-ft. of open space, then the second silo. The third silo is 6 ft. from the second silo, following which is 30 ft. of open storage and then the end and fourth silo. Beyond the end of the fourth silo is 24 ft. of open storage. The pocket between silos Nos. 2 and 3 have been enclosed and acts as a dust storage bin. Dust from this pocket can be sent to the processing plant if desired.

Treatment of Fines

The plant that is devoted to processing the minus 8-mesh material is, for the most part, constructed over three silos. The first step in the treatment of the fines is to screen it through two Allis-Chalmers, Utah type, electromagnetically vibrated, 16-mesh screens. The oversize is sent to a silo from which the material is conveyed by a belt and elevated by a bucket elevator to a battery of two Eagle hammer mills. The hammer mill product is elevated on a Chain Belt bucket elevator to two 4- by 8-ft. Tyler Hummer screens. The plus portion is sent to an Eriez permanent Alinco magnet and the iron removed from it. The material then goes back to the same silo from where it originally started and the material reground in the Eagle hammer mills if desired.

The minus fraction from the Hummers is treated on a Type "A," Dings magnetic separator after which the material goes to its silo and is shipped to make glass and for other uses.

Agricultural Slag

The minus 16-mesh materials from the Allis-Chalmers, Utah type screen can be sent over a battery of Magnetic Engineering & Manufacturing Co.'s high intensity separators to remove the iron, or it can be shipped direct for agricultural slag and other purposes.

Slag, in the minus 10-mesh range, is being recognized by practically all soil chemists, as a cheap and reliable source of minerals that the soil must have, if plant life is to have a well balanced diet. The farmers of the United States, during the past twenty years or more have become educated to the fact that lime, in some form or another, must be added to the soil to rebuild it. Probably too much emphasis has been placed on the question of acidity and alkalinity of the soils but, important as these factors are to soils, it is equally important that soils have in them many elements and compounds that do not, as a general rule, associate themselves with lime and other liming minerals. Manganese, for instance, is an element that all plant life needs, and all slags contain some manganese, and slags from a steel furnace wherein manganese steel is being prepared can contain a considerable amount of that mineral. Boron, or borates, copper, aluminum, magnesium, and many other and more rare elements have their place in the soils, and slag is recognized as an important source of those minerals.

It may be of interest to point out here that some ten to fifteen years ago considerable data was published in the mining press relating to a method of locating copper, zinc, and lead deposits, especially the copper and zinc ores. The method used was to make a chemical analysis of the brush, grass, trees, and other forms of vegetation. If the materials had a copper content above a certain point, it was reasonably certain that the ground in which that vegetation grew contained some copper. And strange as it may seem, other mining experts advocated the same prospecting methods for locating gold and silver deposits. Thus, the mining chemist found that if rare chemical compounds were in the soils, the plants would find a use for them, and nature is not in the habit of wasting its powers of selectivity.

Our attention has been called to the fact that cows have licked all the fresh paint from a barn or shed or that cattle will stand in grass knee high, yet prefer to stick their head through a wire fence and eat grass that is outside the cultivated zones. There is a basic reason for these actions, as experts have pointed out, and these reasons all stem from soil deficiencies. The cow recognized these deficiencies long, long ago, and our science is just catching up with the cow's inborn knowledge. Slag, in the soil, can supply plant life with what minerals animal types want.

Slag Needed by Soil

Many soil experts feel slag is important and are advocating that all agricultural limestone producers mix a certain percent of ground slag with their products, thus making their materials a premium product. With adequate equipment, it was pointed out, ground slag in any desired percentage range could be added to ground limestone, and the mix sold on a bulk or package basis. Such a product would sell at a slightly higher price, would have an effective sales argument, and what is more important to us all, it would add to the fertility of the soils.

Slag is looked upon by many as a very inert and insoluble material and many compare it in their minds with glass. However, when the material is ground reasonably fine, and in combination with the various acids and biological compounds in the soil, it will break down and become soluble enough to be available to plant life. In the laboratory, under certain conditions, it is possible to dissolve slags and even glass, or silica in water. It is also possible to change ther physical structure so as to make them easily soluble in some acids, or make them immune to attack by the more common acids. And these processes are, or can be duplicated in nature, but nature does it in a slow, orderly process, and in the case of ground slag, the changing of a slag from an insoluble material to a soluble one is a slow process, yet it is fast enough to suit the needs of the plant life.

Constituents of Slag

The predominating constituents of a slag are silica, lime, iron, alumina and magnesia. One slag's analysis will differ from another, depending on the nature of the materials going into the furnaces. Iron ore may come from several sources, likewise the other materials going to make up the fluxing charge. In the metal industry, slags usually contain a higher percentage of iron and contain appreciable amounts of copper, lead and zinc. Coke even can supply some of the slag's minor constituents so here at the

(Continued on page 96)

Union Pacific railroad ballast plant and quarry in Granite Canyon, Wyo. Dragline on quarry rim, extreme left, drags hook over quarry face to dislodge any loose rock. Large surge pile, center, is maintained between primary and secondary crushers in order to assure even plant flow

World's Largest Ballast Plant

Granite Canyon, Wyo., plant of Union Pacific railroad maintains large surge pile between primary and secondary crushing plants; has potential of one million tons of railroad ballast annually.

WHAT IS claimed to be the world's largest ballast plant is located in Granite Canyon, Wyo., on the eastern slope of Sherman Hill, 19 miles west of Cheyenne, at an elevation of 7500 ft.

The Granite Canyon plant is operated by the Morrison-Knudsen Construction Co., Boise, Idaho, for Union Pacific railroad. Relatively new, construction of the plant began in July, 1944, and operations started in February, 1945. Since then, well over 1,800,000 tons of ballast have been processed and production is steadily increasing. It is believed that there is enough stone remaining in the 75-acre area to assure production for at least 15 years at the rate of 1,000,000 tons per year.

At the present time the plant, operating on an 8-hr. day, produces 4000 cu. yd. of ballast per day, which is the equivalent of about 80 carloads. The 75 employes necessary for the operation all live in Cheyenne, commuting between the quarry and the city in buses.

Three grades of stone are produced at the Granite Canyon plant. First and foremost is ¼- to 2-in. ballast for the Union Pacific road beds. The other products are riprap and chips, with the balance going to waste. Much riprap is shipped out for fill and foundation work and for embankment protection. Chips, minus ¼ in., are used extensively in the building of roads and depot platforms. Waste is small in tonnage and is bagged as "sand" —being used for flood protection.

Approximately 80 cars of railroad ballast are loaded daily at these two double-chute loading stations. Riprap is loaded from ramps directly to railroad cars

The Granite Canyon operation is divided into two parts: the horseshoe-shaped granite quarry, and the crushing plant. At its highest point at the curve of the horseshoe, the quarry face is 155 ft. in height. A 5-cu. yd. electric shovel and a 2½-cu. yd. diesel shovel load quarry stone to 10 dump trucks for the haul to the plant. T-shaped "Coyote holes" are driven, by drilling and blasting, into the base of the quarry face to a depth of 40 to 60 ft. and have 15-ft. right-angle arms at the end of each. The entries are driven by drills and blasting and are mucked out with an air slusher. The face of the quarry is shot down approximately every six weeks with the main charge of dynamite placed in the arms of the coyote holes. A dragline stationed on top of the rim of the face drags a scarifier over the quarry face to dislodge loose rock.

Plant Flow

Quarry-run stone moved out of the quarry by end-dump trucks goes first to the primary crusher which is a 42-in. McCully gyratory. After passing through a set of grizzlies for dirt removal, the rock drops into the secondary crusher, which is a 7-ft. Symons cone. Rock discharged from this crusher is transferred to a surge pile by a belt conveyor. Material is re-

claimed from the surge pile by a conveyor operating in a tunnel. The secondary crushing section consists of three successively smaller Symons cone crushers.

Finished material is weighed and transferred to a 60,000-cu. yd. stockpile by a conveyor belt. A final conveyor belt carries the ballast from the stockpile to two railroad car-loading tipples. Riprap is loaded into cars from three ramps.

Plant Division

Purpose of dividing the plant into primary and secondary crushing stages separated by a surge pile was, of course, to enable either division to operate while the other might be shut down for repairs. All conveying of material is accomplished by belt conveyors, of which there are 22, totaling 6500 ft. The belts are 42-, 36-, and 24-in. wide.

Equipment

The plant obtains its power over a 13,000 volt line from Cheyenne, but, at the plant, the voltage is stepped down to 2300 volts.

In addition to the trucks and power shovels, the project's major pieces of equipment include three caterpillar tractors, two slusher trucks, two portable welding trucks, 12 stationary electric welders, two flat-bed trucks, five pickup trucks, four draglines, a 2000-cu. ft. stationary air compressor, a 500-cu. ft. stationary air pump, a 750-cu. ft. stationary air pump and a 500-cu. ft. portable air compressor. The operation has its own machine shop and warehouses.

Ray Farrell is Union Pacific's supervisor at the quarry.

Oil Well Cement Practice

IN A PAPER presented some time ago before the Tulsa, Okla., section of the American Chemical Society, N. C. Ludwig, Research Engineer, Universal Atlas Cement Co., New York, N. Y., described the various types of cements and their particular field of use. He outlined the chemical and physical differences between the five principal cement types, as well as testing procedures for oil well cements in use. Mr. Ludwig devoted the first part of his paper to an extensive outline of general cement milling procedure.

In discussing cement milling, the paper dealt with common raw materials and their chemical composition, as affecting the finished product. Types of kilns and fuels used in the burning process were next discussed; followed by a detailed presentation of setting times and controls. Next, the chemistry of setting cement, and the reasons, chemically and physically, for the five main types of cements specified were elaborated. A separate section of the paper was devoted to air entraining cement, with a detailed explanation of the physical and chemical properties of concrete made from this type of portland cement.

Oil Well Cement Properties

As oil well cements and the practice of cementing oil wells is a comparatively new field, Mr. Ludwig's presentation of this subject will be given in more detail here. In wells in which high temperatures are not encountered (under 140 deg. F.), regular or special portland cements that are resistant to moderate sulfate action may be used.

A cement for use in oil wells should have the following properties:

(1) The cement slurry should remain fluid for a period of several hours at temperatures of 140 to 200 deg. F. and then should stiffen and harden rapidly.

(2) The cement slurry should remain pumpable during the first few hours even when allowed to stand at rest for short periods of time.

Special cements as manufactured for use in oil wells in which the temperatures exceed about 140 deg. F. were described in detail. These cements are of two types. The one is usually known as a slow-set cement in which the rate of setting is controlled primarily by the composition of the cement. The other is known as a retarded oil-well cement in which both the time and rate of setting are controlled by additives.

In the first type, sufficient iron oxide is added to the raw mix to convert very nearly all of the Al_2O_3 to $4CaO.Al_2O_3.Fe_2O_3$ or, in some cases, the ferric oxide centent is sufficient to more than combine with the Al_2O_3 as this compound. Cements of this type hydrate and develop strength slowly and their slurries remain pumpable for several hours.

Cements of the second type usually are ground to specific surfaces of 1200 to 1400 sq. cm. per gram which makes their rates of hydration less difficult to control than would be the case if they were ground to specific surfaces of 1600 to 1800 sq. cm. per gram common for regular portland cement and for portland cement types resistant to moderate sulfate action or with moderate heat of hydration.

Mud-Treating Chemicals

In most uses of cement there is not much opportunity for it to become contaminated with harmful materials, but in the cementing of oil wells there are opportunities for the cement slurry to become contaminated with brine waters and with muds. Relatively small amounts of some of the chemicals used in the preparation of these muds affect the stiffening times, viscosities and rates of hardening of cement slurries.

Testing Oil Well Cements

Various types of consistometers for testing the cement slurries at high temperatures in oil wells have been developed, together with a number of procedures for their use. Most notable of these are the well simulation procedures in which actual cementing conditions for different depth wells are approximately simulated.

The setting time and strength tests are usually made at high temperatures under atmospheric pressure. At the present time there are no uniform methods specified for the consistometer and strength tests.

A 5-cu. yd. electric shovel, background, and a 2½-cu. yd. diesel shovel, foreground, load quarry stone to end-dump diesel trucks for the haul to the plant. Note dozer, center, that is kept busy in quarry clean-up work

A New Approach To The Study of Concrete*

By NATHAN C. ROCKWOOD

PRACTICALLY, concrete is an attempt to obtain artificial stone, and in the early days it was frankly described as such; but cement manufacturers and concrete men generally object to describing their product as "artificial" anything. Nevertheless, geologists describe concrete as a kind of bioclastic rock. The "bio" means it was formed through the agency of living organisms, and clastic means it was formed of cemented fragments of pre-existing rocks. Since men are living organisms and they use rock fragments to make concrete, the description is appropriate. Clastic rocks made of rounded, water-worn fragments, or gravel, geologists call conglomerates, and made of angular fragments, breccia.

Many limestones are cemented fragments of shells of primary or secondary origin, and all sandstones are clastic rocks. In graywackes, which are sometimes crushed and used for aggregates, the rock is composed of fragments of any local rock, or a mixture of many kinds. Since nature in most instances has done a better job of making "concrete for permanence" than human "organisms," it seems logical to look into the ways by which nature produced its clastic rocks, with special reference to the cements. Much on this subject can be learned from any good book on geology, but particularly from F. W. Clarke's "The Data of Geochemistry," Bulletin 770, U. S. Geological Survey.

It may be recalled that the first really scientific approach to a study of cement and concrete in this country was made in the Geophysical Laboratory of the Carnegie Institution as a part of a study of igneous rocks. Geochemists or physical chemists are interested primarily in the origin of various kinds of rocks, and their work leads them to make synthetic minerals, and portland cement is one. Also, they study the causes and processes of rock disintegration. Unfortunately, for a broad-visioned approach to a study of concrete, after the start geochemistry gave investigators in this field, its study seems largely neglected as a source of ideas and clues to the solution of concrete problems. It is true, of course, that concrete research has borrowed much from geologists and geochemists in the way of methods of laboratory investigation, but cement and concrete researchers have not fallen back much on the vast accumulation of fundamental geological research data, which may prove very helpful and stimulating in a new approach to the study of concrete.

The concrete industry is beginning to appreciate the value of geological knowledge by the employment of petrographers, geological chemists and physicists, but thus far little real application has been made of such relevant geochemical data as that to be gleaned from Clarke's book, already mentioned. One has only to read sections of this book to see that there can be no inert rock or soil, since many disintegrating agencies are constantly at work, dissolving, shifting and redepositing the various minerals of which all rocks, including bioclastic concrete, are composed. And some of these agencies can work fairly rapidly under favorable conditions. Some rocks resist disintegration much longer than others, and it would seem that the study to determine chemical and physical characteristics which make them last longer could be a logical part of the study of concrete.

Cements Used in Nature

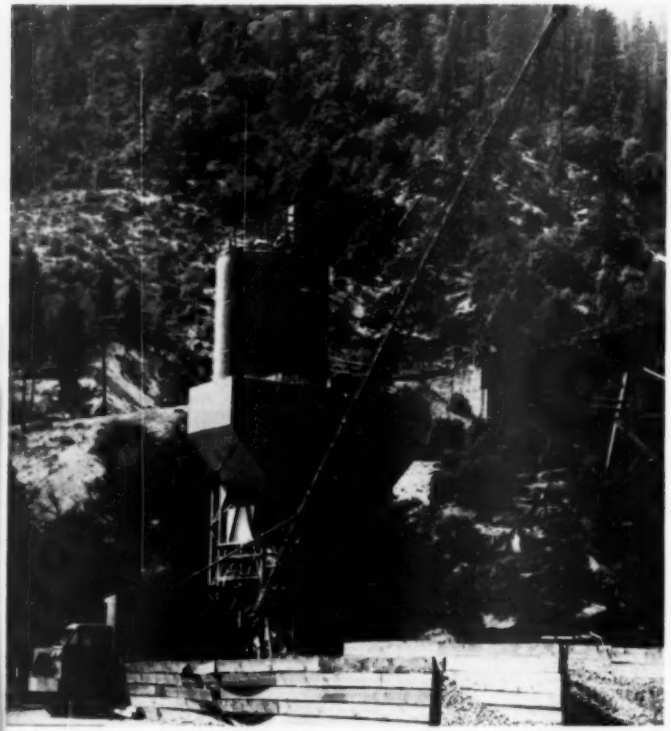
The source of both aggregates and cements in Nature is in the igneous rocks, which are derived from the Earth's original magna—that is the molten mass which was our planet. These formed the outside crust before moisture and gases in the atmosphere condensed to form rain and the oceans, rivers, lakes and living organisms. When moisture and carbon dioxide and other gases that the atmosphere may have contained started to work on the original igneous rock crust of the Earth, these rocks began to disintegrate. From their disintegration came all the secondary rocks such as limestone, sandstone, and many other varieties, as well as gravel, sand, silt and clay, which go to make up the soil. The rocks and soil are what geologists call the lithosphere of the Earth.

The most plentiful chemical element in the lithosphere is oxygen. Some 46 percent or nearly half of all rocks and soil is oxygen. The second most plentiful element is silicon, which comprises nearly 28 percent. Since neither element occurs in the lithosphere in a free state, a great deal of both is accounted for by the mineral silicon dioxide, or silica, the most common kind of sand. Silica then accounts for 60 percent of the lithosphere and it is a component of nearly all rocks—and the chief component of all except carbonate rocks—the familiar limestones and dolomites. Anything that Nature supplied in such abundance must be important to Nature's economy. We might hazard a guess that it is chiefly a silica cement which keeps the Earth's crust intact. We will return to silica, in the meantime let's consider some of the other cements in natural clastic rocks, or Nature's own kind of concrete.

Clarke describes the formation of Nature's concretes in part as follows: "By pressure, or by injection of cementing materials, the products of rock decomposition may be reconsolidated. From sand, sandstones are formed; from clays, shales are derived, and calcareous deposits yield the limestones. * * * A sandstone differs chemically from a sand chiefly in the addition of a cementing substance. This is furnished by percolating waters, or else, in certain cases, by the slight solution of the moist surfaces of mineral particles in contact with one another."

Here let us explain by an example just what this means. The St. Peter sandstone, which is mined at Ottawa, Ill., and elsewhere, and known as "standard Ottawa testing sand," is a beach deposit where wave action kept the sand particles rubbing on each other for thousands, perhaps millions of years. This rounded off the particles, so that they are almost perfect spheres, and it covered the surfaces of the particles slightly with dissolved or colloidal silica. There is no overlying rock, so the cement or bond which holds these particles together is merely this very thin coating of solidified collodial silica. With no pressure applied this bond is weak and the

*Abstract of a paper prepared for and read at the annual meeting of the Indiana Mineral Aggregates Association



Batching plant on a utility company dam construction job in the Sierra Nevada Mountains, Calif.

rock, while it stands in a vertical face, and has to be drilled and blasted, is easily broken up into its individual grains by streams of water from hydraulic monitors.

In western Pennsylvania, West Virginia and eastern Ohio, the same kind of a silica rock, or sandstone, has been subjected to pressure of overlying rock strata, and while the cement or bonding material is much the same, the Eastern rock is strong and compact and requires crushing by mechanical methods.. If silica cement has the opportunity to reach its ultimate form, the result is quartzite or ganister, which is about the toughest and strongest rock in Nature.

From these facts isn't it plausible to reason that concrete mixtures, or at least the sand part of the mixture, would be improved by long turning over or grinding? The limitations on the time that a mix is allowed to remain in a concrete mixer are, of course, conditioned by the setting time of the cement, but any colloidal silica that may be produced in the mixer or elsewhere would appear to be a definite advantage, as will be seen when we come to consider the hydration products of portland cement. It is probable that a deficiency of reactive silica is one reason for the lack of permanency of present-day concrete.

Returning to Clarke's "Data of Geochemistry," he says: "Any substance which the waters can deposit in a relatively insoluble condition may serve as a cement. In addition to silica are calcium carbonate, hydroxides of iron and aluminum, calcium sulphate, phosphate and fluoride, barium sulphate, etc.; also clay and bituminous substances."

The poorest of these is clay, because the physical structure of certain kinds of clay particles consists of minute flat-plate crystals with soluble alkali bonds between the plates, and when molecular water gets in and dissolves these bonding atoms or molecules, the remaining parts of the clay particles separate or swell. Limestones which contain such clays will disintegrate readily from weathering, and when used as concrete aggregate have been known to cause expansion and disintegration of concrete—a fact known long before the present agitation about "reactive aggregates."

Calcium and magnesium carbonate cements in nature are satisfactory when the cement particles are of limestone. Colloidal calcium carbonate, or dissolved limestone, appears to have the property of building up existing crystals of calcium carbonate, just as colloidal silica will build up existing crystals of quartz. However, calcium carbonate does not make a good cement for sandstones, because it is much more soluble than silica, and subjected to percolating waters or weathering such sandstones lose their bonding material fairly readily. Under conditions in which water carries considerable silica in solution, the silica may replace some or all the calcium carbonate.

Chert, for example, is assumed to be the result of waters high in dissolved or colloidal silica percolating into voids and cavities in limestone. In the course of geological periods, it is solidified and the limestone may be dissolved away, leaving accumulations of chert sand and gravel, which are so common in the southern half of the United States, below the glacial lines. Chert is mentioned here not as an aggregate but because it appears to be from its nature a desirable mineral ingredient in concrete—that is, it is a form of colloidal silica and colloidal silica may very likely be an end product of the hydrated cement itself.

Forms of Silica

Quartz is by far the commonest form of silica, and it is the most stable form. The fact that so much of it has survived after all the other components of such rocks as granite have been dissolved or reduced to clay, is proof of its durability. Quartz can be very slightly dissolved or made colloidal in pure water, and more so in rain and surface waters, as has been shown by example of the formation of the St. Peter sandstone, but it comes as near being inert under ordinary conditions as any common mineral. It is supposed to be the end product of colloidal silica or silica solution.

All surface waters in flowing streams carry some dissolved or colloidal silica in the form of opaline or hydrous silica. With loss of water in this solution or colloidal suspension, a deposit of silica forms first as a gel, and with the continued loss of water by evaporation, or from pressure or heat, it passes into a solid which is known as opal. Agate is an example.

Chalcedony, chert and flint are other forms of so-called amorphous silica, but geologists differ as to exact definitions. They are usually of a fibrous or cryptocrystalline structure. The most logical explanation seems to be that they are midway between very fine grains of quartz and opal—possibly grains of quartz cemented by opaline silica. Quartz particles or crystals have the property of orienting themselves along a certain axis, which could account for the fibrous structure.

While discussing silica, attention is directed to another source of information that does not seem to be consulted by research men in concrete. It is "The Properties of Silica," by Dr.

Robert B. Sosman, published in 1927. Since silica is perhaps the most important ingredient of cement and concrete, we can't learn too much about it. For example it is usually assumed in concrete literature that chert, the properties of which resemble those of vitreous silica, because it is silica has a relatively high coefficient of expansion. Actually, according to Sosman, vitreous silica unlike quartz has practically no expansion over a wide range of temperatures from way below 0 to several hundred degrees C. Chert pebbles instead of popping out of concrete pavements on a hot summer day because of their own volume change are more probably pushed out by volume changes in the surrounding concrete or mortar matrix.

Returning to the subject of Nature's cementing materials, it often happens that combinations of the primary minerals mentioned also occur. Thus calcium carbonate and silica in some kind of a combination may be the cementing material. Similarly clay may become impregnated with colloidal silica or calcium carbonate and its character as a cement improved. One thing is certain from geology and geochemistry, there is no cement in existing rocks which resembles hydrated lime and hydrated calcium silicates of the type claimed to exist in hardened concrete.

Man-Made Cements

The first attempt to produce a cementing material was probably to use clay or mud. Sometime early in recorded history man learned to make lime. The Romans, some time before the beginning of the Christian Era, developed an hydraulic cement. It was known before the time of Vitruvius (first century A.D.) that lime mixed with a volcanic ash, or puzzolan, made a cement suitable for underwater concrete. Some of that concrete is still in existence after 2000 years. The Roman constructors, according to Vitruvius, looked upon puzzolana as special kinds of sand or fine aggregate. Their mixture for cement was apparently 2 parts of puzzolan to one of lime. Of course the puzzolan was not all finely pulverized and therefore probably not all reactive, but the proportion of lime to reactive puzzolan must have been at least 1:1. This proportion is important because nearly all developments in hydraulic cement manufacture since were in the direction of increasing the proportion of lime at the expense of the reactive silica.

Present-day cement researchers account for the remarkable preservation of some Roman concrete by saying it is due to a benign climate, and emphasize that all the Roman concrete wasn't good. Anyone who reads Vitruvius' book on architecture, or that part of it relating to mortars and concrete, will see that there were several kinds of lime in use and various sources of puzzolana. For sea-water concrete he recommended only certain kinds of both. Doubtless there were many jobs where these recommendations were not followed. Apparently, where they were, the concrete is still there. The Romans knew only the result of using a mixture of lime and a puzzolan; however, they did account for the superior cementing properties by the fact that both materials had been treated by fire. Since then we have apparently directed efforts more to research to find out why lime and silica produce cements than to concentrating on mixtures known to produce satisfactory results.

Closeup of a spillway section of one of the T.V.A. dams

It is commonly said that during the Dark Ages civilized man lost the art of making hydraulic cement, but history rather leads to the belief that artisans in the Mediterranean, or Latin, countries continued to pass on the formula from father to son. However, it was not until several centuries later that engineers and constructors in northern and central Europe discovered the reason for the difference between ordinary and hydraulic limes. As soon as it was known that silicious or argillaceous impurities in a limestone gave it the property of making an hydraulic cement, the transition to compounding and burning artificial mixtures of lime or limestone and clay was more a matter of evolution than an invention.

What is the difference between hydraulic limes, natural cements and the early portland cements? From the angle of chemical composition, so far as anyone has been able to determine, there was little difference. An eminently hydraulic lime and the other two cements all contained lime in proportion to silica and alumina of about 3 to 2. Since they were seldom burned hard enough to combine all the lime with argillaceous or acid ingredients, there was always free or uncombined lime present in the product. In the case of hydraulic limes this was sufficient to hydrate separately and reduce the material to a powder without grinding. That was possible also because the burning temperatures in the shaft lime kilns were low enough to avoid "dead-burning" the lime, which makes hydration of lump lime difficult and time consuming. The natural cements and early portland cements were somewhat harder burned and would not hydrate until pulverized. The harder, or longer, burning made a cement that hardened faster than hydraulic limes, but judging by surviving structures it resulted in mortars and concrete of no greater permanency, and the French engineers have continued to use hydraulic limes for their most important seawater construction, and many ancient structures are still good concrete.

Apparently nearly all hydraulic limes, natural cements and early portland cements contained considerable percentages of the oxides, chlorides or sulphates of the alkali metals—sodium and potassium. Probably, the best puzzolana did also. There is evidence that these alkalies were considered desirable. At the moment they are looked upon by many engineers as undesirable, but a study of research work that has been done in the field of solu-

(Continued on page 79)

Primary and secondary crushers are located in building to left with final screening and storage, to right

Dolomite for Steel Mill Flux

New plant of Rock Products Manufacturing Corp., Ada, Okla., is first plant in area to produce flux, fertilizer filler and stone for agriculture

By WILLIAM E. HAM*

MARKETS FOR high purity dolomite in the Southwest are now being supplied by Rock Products Manufacturing Corp., Ada, Okla., which opened its quarry and crushing plant at Troy, in the Arbuckle Mountains of south-central Oklahoma, on June 1, 1948. This marks the first production of chemical grade dolomite in the region. Demand is strong and, from preliminary market surveys, a wide variety of uses are indicated. The plant furnishes high-magnesian flux to the iron ore blast furnace of the Lone Star Steel Co. at Daingerfield, Texas, and minus 10-mesh stone is being supplied to glass manufacturing plants in Oklahoma and adjoining states. Agricultural limestone will also be produced and some of the product will be sold for prepared fertilizers and concrete aggregates.

Character of Deposit

The deposit is in the Royer dolomite of Upper Cambrian age, which has been mapped by the Oklahoma Geological Survey and shown to crop out on 1400 acres in the district between Mill Creek and Ravia. The formation is 550 ft. thick, and it has been estimated that 150 million tons of high purity dolomite can be quarried without the necessity of removing overburden and without quarrying below the water table. The present quarry site is three miles west of the plant site near Troy.

Construction of the project, begun two years ago, was repeatedly delayed by shortages of steel and other construction materials. Furthermore, rough terrain, densely timbered in some places, had to be traversed in laying narrow-gauge tracks the three miles from the quarry site to the crusher. One cut, 1400 ft. long and 28 ft. deep, was made in solid granite and two steel bridges were built over flowing streams. Now completed except for minor finishing touches, the plant has equipment designed to produce 275 tons of crushed stone per hour.

Quarry Operation

At this writing the quarry face is 500 ft. long and averages 25 ft. high. The face will increase in height to more than 65 ft. as the workings move farther back into the gently sloping hillside, and the length will eventually be increased to perhaps 1200 ft. The quarry site contains 60 acres of company-owned land, with high purity dolomite underlying all the property. The site has excellent advantages because there is no overburden and no trees are growing on the surface, this being the typical "Rock Prairie" of the eastern Arbuckle Mountains.

The stratified dolomite at this locality dips 10 deg. SW and the face is driven in against the dipping beds, permitting easy maintenance of a level floor for the quarry rail line.

Six-inch blast holes are made with a churn drill on 10-ft. centers and with 16-ft. burden. Drilling is done to 6 ft. below quarry floor, giving at present a maximum depth of 38 ft. and maximum quarry face height of 32 ft. Away from the crest in the center of the face, the ground surface slopes downward and shallow drilling on the sides is done with an Ingersoll-Rand wagon drill driven by compressed air and drilling 2⅝-in. holes. Ordinarily about 15 blast holes are shot at a time, with eight sticks of Atlas Geodyne No. 4, 5 x 16 in., being detonated in a 38-ft. hole. Compressed air for the wagon drills and the jackhammer drills for secondary shooting in the quarry is furnished by two Sullivan compressors of 315 and 160 c.f.m. capacity.

Broken stone is loaded by 1¼-cu. yd. gasoline-powered Northwest shovel into 7-ton, side-dump, all-steel quarry cars, which are hauled to the crushing plant by 20-ton, 160-hp. Vulcan gasoline-powered locomotives. Each of the three locomotives hauls three to five loaded cars.

Processing

At the plant the cars are dumped by a chain hoist to a receiving hopper from which stone is fed by a Lippman 36-in. flight conveyor on 22-ft. centers to a 24- x 36-in. Lippman jaw crusher set to reduce all stone to minus 6 in. Stone from the crusher is carried by 24-in. belt to the No. 1 screen unit which is a Simplicity 3-deck vibrating screen, fitted with 1½-, 1-, and ½-in. screen cloth. A fourth screen deck of ¼-in. opening is being used at present to remove the small amount of dirt that is associated with the initial opening of a quarry.

Most of the stone sold at present is of minus 6 in. size for use as flux in iron ore smelting at the Daingerfield, Texas, plant of the Lone Star Steel Co. The minus 1-in. stone is removed from this product before going to a 30-in. belt conveyor for direct loading into hopper cars on the railroad siding.

Sized stone from the screens goes either to stockpiles or to one of two secondary crushers. A Cedarapids 40- x 24-in. roll crusher takes minus 1½ in. stone for further reduction, while minus 1-in. stone is fed to a 24-in. Symons standard cone crusher.

Rock from the roll and cone crusher is taken by 24-in. belt conveyor on 150-ft. centers 60 ft. up to the storage bin structure where two Simplicity vibrating screens make minus ¾ in. and minus 10-mesh separations. The four hopper bins, each of 110-cu. yd. capacity, provide direct car loading and contain minus 1½ in. stone. Some of the stone used for road metal and concrete aggregate is stockpiled in the open by a 500-ft. conveyor belt from the secondary crusher building.

The buildings are of fireproof welded

*Associate Geologist, Oklahoma Geological Survey, Norman, Okla.

steel construction, with sheet metal covering. In addition to the primary and secondary crushing buildings and the storage bin unit, there is a powerhouse containing a 375-k.w. unit driven by a General Motors diesel No. 71 Quad rated at 900 hp., and a modern machine shop with lathes, heat-treating furnaces, a welding shop, and other maintenance equipment.

Chemical Analyses

In marketing the stone the company emphasizes the exceptionally high purity of the dolomite and will cater to industrial users demanding stone of low impurity specifications. As a flux for iron ore smelting, the Royer dolomite is especially desirable because of the low silica, alumina, phosphorus, and sulphur content. The low iron oxide content of 0.090 percent makes it well suited for glass making and the minus 10-mesh product is shipped to glass plants. The accompanying table shows analyses of the Royer dolomite.

Loading dolomite into 7-ton, side-dump, narrow-gauge quarry cars

and yellow. In texture, the dolomite is even-grained, the individual rhomb-shaped grains being about 0.2 to 0.5 mm. in diameter. No impurities such as chert, quartz, sand or pyrite are visible. Most of the rock is compact, although a little of it contains small irregular openings lined with tiny dolomite crystals. Uniformity in physical properties and chemical composition are fully expected and the company will strive to maintain constant uniformity for the benefit of its chemical market.

Chemical Composition of Royer Dolomite*

Average of 9 outcrop samples in Mill Creek-Ravia area.		Minus 6-in. stone representing 600 tons loaded for shipment.
SiO_2	0.41	0.315
Fe_2O_3	0.157	0.090
Al_2O_3	0.177	0.195
CaO	30.71	30.16
MgO	21.18	21.64
K_2O	0.051	0.059
Na_2O	0.029	0.036
SO_3	0.031	0.032
P_2O_5	0.004	0.002
H_2O at 105° C.	0.11	0.06
L. O. I.	47.26	47.383
TOTAL	100.219	99.970
Recalculation		
$CaCO_3$	54.81	53.85
$MgCO_3$	44.29	45.16
TOTAL	99.10	99.00

*Analyses by Oklahoma Geological Survey

The quarried stone is light gray to nearly white, showing in some places a faint mottling by pale shades of red

Willard D. Ryder, vice-president, Rock Products Manufacturing Corp., right, and Abe C. Davis, superintendent, Troy crushing plant

The Rock Products Manufacturing Corp. has its office in Ada, Okla. W. E. Ryder is president and W. D. Ryder is vice-president. Abe C. Davis is superintendent of the quarry and mill. The plant is located one mile north of Troy, which is 100 miles southeast of Oklahoma City and 30 miles south of Ada. Troy is served by the St. Louis-San Francisco (Frisco) railway and by Oklahoma Highway 12. The bulk of the sales at present are for fluxing stone, of which 300 to 500 tons per day are shipped.

Brazilian Portland Cement

BRAZILIAN PORTLAND CEMENT ASSOCIATION reports a production of 964,000 tons of portland cement during 1947, with additional capacity of 390,000 tons aded in 1948. Some 35,000 tons more are projected for 1949.

Cost of Accidents Emphasizes Need for Safety

MARBLEHEAD LIME CO., Chicago, Ill., has adopted what it calls a new approach to acquainting superintendents and supervisory personnel with the cost of accidents. Having competed for a number of years in the National Lime Association annual safety contests, the company's various plants all have been advised of their standings in terms of frequency and severity rates. To supplement this information, the company furnishes to each plant a monthly statement showing the monthly cost and the accumulated total cost of accidents for the year expressed in terms of cents per man-hour worked. This information can be related to frequency and severity rates if proper caution is taken in using all the costs that accrue to an accident, such as weekly disability benefits, hospital and medical expenses. These payments carry on into other periods so that comparisons are difficult unless they are estimated accurately. According to W. E. Wing, president, this supplemental information provides a valuable comparison for the various plants and acquaints the safety personnel with the costs of accidents and the importance of a good safety program.

Outstanding Safety Records

BUREAU OF MINES has announced Information Circular 7482, entitled "Some Outstanding Safety Records in the Mining and Allied Industries," which may be obtained free from the Bureau Publications Section, 4800 Forbes Street, Pittsburgh 13, Penn. In addition to outstanding safety records, the circular includes tables showing safety awards according to industries and states, outstanding records of no-lost-time from injuries, and long periods without fatalities made by major branches of the various mining industries.

Solution of Problems In

MANUFACTURING ROCK WOOL

Final part in series of articles on processing problems encountered in the manufacture of rock wool. Use of cupola gases under boilers

By VICTOR J. AZBE*

WHEN INCOMPLETE combustion loss is 40 percent, the loss due to CO is 6090 B.t.u. per lb. of carbon, and at this loss 8.05 lb. of air is used, so 755 B.t.u. is available per lb. of air, or a theoretical possible temperature of 2750 deg. F. Full recovery, of course, would not be possible, but even 1000 deg. F. would help greatly.

In some cases preheated air was tried without much success. The degree of preheat was never high and, when not high, there can be many other developments to disguise the real results. Therefore no reliance can be placed on the test. The plain fact remains that cold air injected into the oxidizing zone must first be preheated. If it had already entered preheated, such preheating would not be necessary and the corresponding amount of coke would be saved.

At this point the question is the effect this would have on the reduction and preheating zone. On the one hand, less coke would be burned and so less gas would pass upward and its reduction to CO would be more complete, but this would be offset by the fact that coke would be less, thus offsetting this tendency.

With less gas passing, it would be cooled off faster, reducing the extent of the melting zone, but this could be offset by increasing the amount of air and operating with a higher excess which would have the tendency to reduce the CO.

The process is sort of a chain and any change at one point is felt all along the line. Just how operation is affected is not entirely clear, but in any case the use of preheated air would be beneficial. It certainly is in blast furnace practice.

Use of Cupola Gases Under Boilers

Use of cupola gases under boilers can be and has been employed, but this is substituting an expensive fuel for a cheap fuel. Still the coke lost through CO amounts to so much per day that it should be well worth it to try the practice as a last resort. It has been tried in many cases and in some abandoned. In one case the statement was made, "Too much sand from the cupolas enters into the ducts." But it seems that such difficulties could be corrected. Another difficulty mentioned was leakage of air at the cupolas, which also could be taken care of, at least to sufficient degree to make the practice worthwhile.

It seems foolish that we strive to reduce the CO to 0.1 percent or less with boilers while with cupolas we waste gas with 15 percent or more CO. This gas certainly is burned in boilers because when introduced in the combustion space, none of the CO appears in the stack. While not all of the resultant heat becomes available due to differences in the temperatures of cupola gases and boiler stack gases the subject is worthwhile in striving for efficiency.

However, avoidance of CO gas, or its utilization for preheating of air would be more desirable as it not only would save coke instead of the much cheaper coal but would also tend to raise the cupola capacity and, besides the fuel saving, would accomplish a saving in labor which would carry through the entire plant.

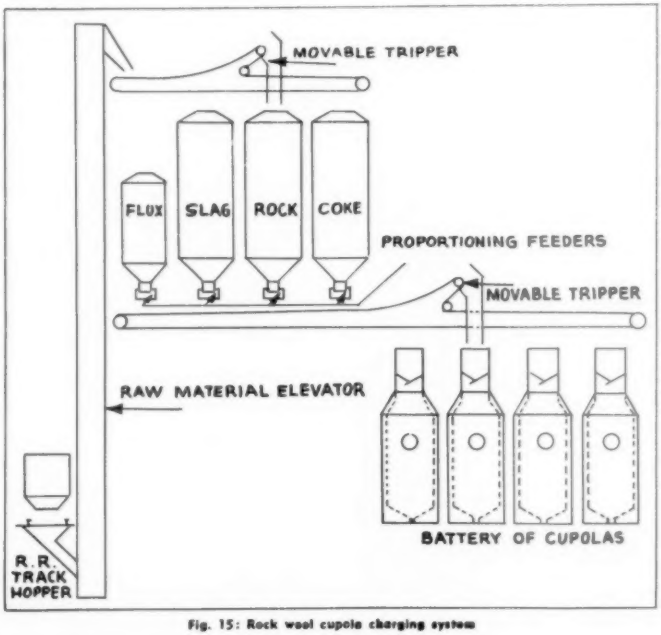


Fig. 15: Rock wool cupola charging system

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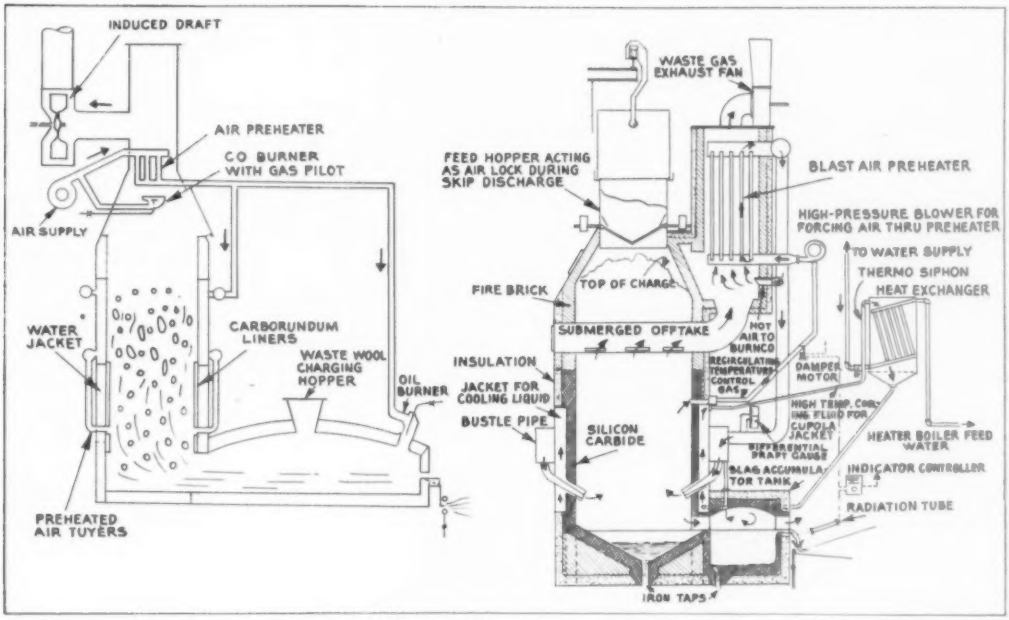

Fig. 13 (left): Schematic study of a cupola combination. Fig. 14 (right): Schematic view of improved system of rock wool cupola operation

Studies of Cupola Systems

In the following are presented three studies of firing arrangements aimed at improved cupola performance. The first two are a bit old, but in some respects they are sound while in others they are not. The third is of a modern arrangement which has promise.

In the first example, Fig. 12, the cupola gases are lead to the boiler. A high temperature liquid such as Dow-Therm passes through the jacket. Raising the jacket temperature reduces the jacket heat loss. Whatever heat is abstracted is used to superheat steam and to preheat the air. The hot air passes through the upper section of the jacket to the tuyeres.

There is very little criticism of this arrangement, except that if heat of CO could be saved for the cupola, rather than for the boiler, it would be much better.

In the second system, Fig. 13, the CO is burned in the upper part of the cupola and the heat generated is used to preheat the air. The hot air passes through the upper jacket on the way to the tuyeres. In the lower sections water is used, but the walls are very thinly lined to reduce jacket loss. The cupola is supplemented with a tank to assure a homogeneous mixture. The tank is designed to receive waste wool. The entire system is under suction of a fan. This arrangement contains some worthwhile features and some impractical ones. The gases from the tank could not pass through the cupola very well. The tank is unnecessarily large.

Fig. 14 presents the most recently-developed "Azbe Cupola System" and possibly the most efficient. There are many novel features as follows:

1.) Gases are withdrawn through a submerged off-take either by means of a pipe located diagonally across the cupola shaft as shown, or circularly through openings in the cupola wall. Through this means, waste gas temperature remains constant even though the charging is intermittent.

2.) The cupola charging is mixed, rather than in layers, to maintain the coke at the lowest possible temperature until it reaches the oxidizing zone. Coke, if possible, is conditioned.

3.) The cupola is equipped with a feed hopper incorporating an air lock to reduce the leakage air from the cupola, which, if desired, can be prevented entirely by connecting the feed hopper to the fan suction and equipping it with a suitable damper which would open when the charging would take place.

4.) The cupola is oval in shape and of large cross-sectional area. It has a waste gas exhaust fan of sufficient capacity to overcome the resistance of the air preheater and to permit the maintenance of balanced draft at the charging level.

5.) Immediately under the preheater the cupola gases receive the proper amount of hot air and are allowed to burn. This preheats air for the cupola as well as that for the combustion of CO gas.

6.) The hot air is measured in volume and injected into the cupola through special nozzle-shaped tuyeres calculated to give the air a high velocity, and thus deep penetration.

7.) There are a great number of these tuyeres, since high capacity cupolas demand a large amount of air, and hot air has increased friction.

8.) The tuyeres project a slight distance into the cupola to minimize blocking. For this, and other reasons, they point in a downward direction.

9.) Upper portion of the cupola is brick-lined and insulated.

10.) Lower portion of the cupola is jacketed and has a thin lining. The lining is for insulation; reduction of heat loss from the most active zone of the cupola to the jacket.

11.) The jacket helps keep the lining temperature in balance, that is, prolongs its life and at the same time intercepts any heat that passes through.

12.) The high temperature jacket liquid is circulated through a boiler feed water preheater.

13.) The cupola is equipped with a small auxiliary tank, which is heated by the gases from the oxidizing zone of the cupola.

14.) Temperature of the exuding slag is measured and recorded.

15.) Temperature also is automatically regulated by the arrangement as shown, by recirculating some of the hot gas from the cupola containing

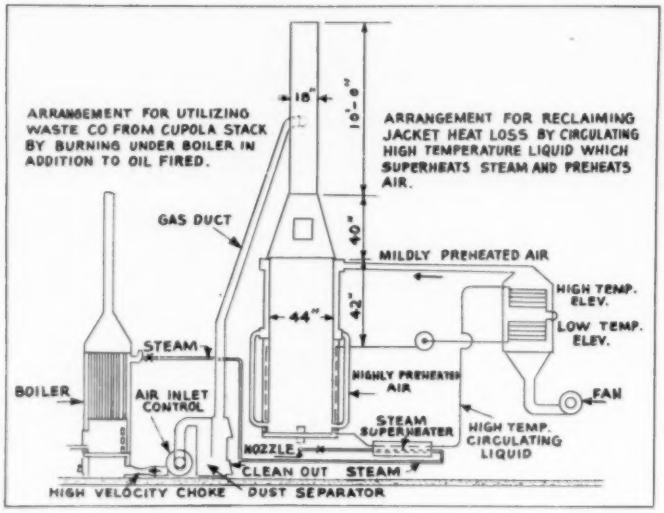

Fig. 12: Ideal arrangement of a rock wool cupola

CO_2 and CO to the suction of the high pressure blower which supplies air through the preheater for the cupola.

Cupola Labor

Cupolas of as much as 40 to 50 tons capacity should be entirely possible and such cupolas could be operated at very low labor cost per ton of output. One man could take care of the taps on at least two cupolas and, with a properly designed layout, one man should be able to charge four cupolas.

Fig. 15 is of an almost entirely mechanized layout, to eliminate hard labor. The stone, slag and coke would be unloaded into elevated bins constructed to avoid segregation of sizes. This would require one man. From there, the raw materials would be charged across poidometers to a belt which would feed them mixed to a drop bottom bucket traveling on a monorail across the cupola top. Even the belt could be made to feed the charge directly into the cupolas, all under one man's supervision. Of course there would be incidental labor but it is hard to understand why a 150-ton wool plant should require any more labor than a 150-ton lime plant.

Conclusions

In this series of articles, the author has tried to present many factors which govern cupola capacity and efficiency. He also has tried to point out ways to improve certain conditions. Some of these ways are simple, while others are more complex, and possibly still in the development stage. But, whether they be simple or complex, the engineer to whom the cupolas are entrusted should be familiar with them or consider the possibilities.

Great improvement is possible if the problem is attacked fundamentally and scientifically, and may provide so much satisfaction as to amply repay for any extra effort put forth.

Expansive Characteristics of Hydrated Limes

NATIONAL BUREAU OF STANDARDS recently issued Publication RP1917, "Expansive Characteristics of Hydrated Limes and the Development of an Autoclave Test for Soundness," which may be obtained from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. The publication deals with the technique for preparing, curing and autoclaving 1- x 1- x 10-in. cement-lime bars and the determination of the expansive characteristics of 80 commercial hydrated limes. From criteria set forth for determining the soundness of hydrated limes, a test is proposed with a suggested limit of expansion of 1.0 percent.

On the basis of chemical analysis and percentage of unhydrated oxide, the hydrated limes were classified into four series: high-calcium, regularly hydrated dolomitic, highly hydrated dolomitic, and magnesian. The effect of 17 different portland cements on the expansion of cement-lime bars showed that the expansion values for a particular lime tended to increase as the expansion value of the constituent cement increased. With an autoclave specially modified for ascertaining the behavior of the bars during autoclaving, it was found that only a slight amount of the total expansion occurred before a temperature of 150 deg. C was reached; but above 150 deg. C a rapid expansion rate was noted, which in turn tapered off before the temperature reached 216 deg. C.

Domestic Talc Production

DOMESTIC TALC, through improved methods of processing, is said to be establishing itself firmly in the American cosmetics industry, rivaling that of France and Italy. Prior to World War II, U. S. talc wasn't considered good enough to compete with the fine imported talcs, but during the war became important as an insulating material for radar equipment. Thousands of tons were processed and the processing methods now have been adapted to meet the requirements of the cosmetics industry.

According to Dr. Oliver L. Marton, chief chemist of Shulton, Inc., Clifton, N. J., the new manufacturing process yields a tailor-made powder "practically free from grit and possible abrasive skin effect and also devoid of those talc particles which would be so fine in size they might be apt to clog pores when applied to the skin."

Special test equipment controls the size of particles. By measuring the rate of fall of the talc particles, it is possible to calculate their size. "The finished powder is made to conform with a set of specifications established to reduce the natural alkalinity of the talc among other features," he said.

Ore-Dressing Methods For Barite

METHODS used to remove impurities from barite ore from New Mexico, Missouri, and Arkansas are described in Report of Investigations 4280 released by the Bureau of Mines, and entitled "Investigation of Ore-Dressing Methods for Barite Ores from New Mexico, Missouri, and Arkansas." Domestic barite production has almost doubled within 10 years, according to the publication. In 1935 about 218,000 tons were produced in the United States. By 1944, production had jumped to 515,000 tons. Copies of the report may be obtained free from the Bureau of Mines, Publications Section, 4800 Forbes street, Pittsburgh 13, Penn.

Geology of Missouri

A GEOLOGIC MAP INDEX of Missouri has been published by the Geological Survey, according to an announcement by Director William E. Wrather. The index—scale about 12 miles per inch—outlines in color the areas in Missouri for which geologic maps have been published. Source of publication, scale, date and author of each map are included. Copies of the index may be obtained from the Geological Survey, Washington 25, D. C., at a cost of 30c.

Group picture of "students" attending short course in Washington

N.C.S.A. SCHOOL FOR SALESMEN

Crushed stone producers attend largest school for salesmen, to learn technical data and test methods as background for future selling

By W. B. LENHART

THE NATIONAL Crushed Stone Association held its third short course for crushed stone salesmen in Washington, D. C., February 2-5, with class room sessions in the United States Chamber of Commerce Building and at the laboratories of the association. There were about 120 "students" and speakers registered for the meeting, all of whom were very interested in the course offered; all the class room discussions were thorough and serious. Engineering director A. T. Goldbeck is to be complimented on developing and conducting a school where daily attendance was possibly 95 percent or more of the total registered, and where speakers were placed on a time schedule that was adhered to in a punctual manner.

The manner in which the classes were conducted was along the lines followed by technical sessions at most conventions, namely, there was a chairman and there were speakers with broad experience in their chosen field of activity; followed by discussions and a question period at the conclusion of each speaker's talk. The age range of those in attendance was broad and with a considerable number who had spent practically their entire adult life in the crushed stone industry. This editor was very impressed with the possibilities offered by this course, and in private conversations with many of the others in attendance, he shares the enthusiasm that was expressed universally by those contacted as to the value of the program.

The short course was the third one conducted by the association. The last two were held in 1944. The first meeting was held in Washington, D. C., and the second in Albany, N. Y. It is planned to hold future classes, possibly in years that do not have manufacturer's exhibits, which would mean every other year. The decision as to how often to hold such schools, however, will depend entirely upon the interest displayed by the members of the association. It was also indicated that future meetings would be during the week preceding the national conventions, so that those who wished to do so could attend both on the same trip. One thing we liked about the method of conducting the sessions was to have a 5 to 10 minute adjournment period between speakers.

There was considerable more time, effort, and speakers to give the students basic facts relating to "black top," or bituminous types of roads, than there was on concrete. To illustrate this we might use the pamphlet given each student. It was entitled, "Highlights of the Third Short Course for Crushed Stone Salesmen," and it briefly outlined what was to be discussed during the meeting. The booklet had a total of 19 pages of which, roughly speaking, 1½ pages were devoted to geology, 5½ to general gradation and aggregates, 3½ to the proportioning of concrete, 6½ to tar, asphalt, bituminous, and macadam roads, ½ page to railroad ballast, one page to trickle filter rocks and one page to crushed stone for concrete blocks. The time was prorated roughly to those proportions.

The discussions that followed each subject of discussion were numerous, interesting, and sometimes lively, and as the group included 10 or more representatives from portland cement manufacturing companies, the statements made by one type of road constructors were not always accepted as gospel by the other group, and each group had a good opportunity to "sell" its ideas to the rest, which we think is the type of education in which salesmen should be well grounded. These friendly arguments supplied verbal ammunition for all concerned.

The geographical distribution of those in attendance, was, as might be expected, eastern in its general tenor with the States of New York and Pennsylvania having large numbers in attendance. The New England states were well represented as was North Carolina. A representative from Texas and one from Minnesota were two that possibly came the greatest distance to attend the meeting, and both

Students and speakers at the National Crushed Stone Association "Short Course for Salesmen," held recently in Washington, D. C. No. 1: Joe Gray, N.C.S.A., explains some of the testing equipment to a few "students." No. 2: A. T. Goldbeck explains the workings of the circular track to E. E. Dotter, on the left, and Oscar Benson on the right. These men are assistant general superintendent and general manager, respectively, of General Crushed Stone Co., Easton, Penn. No. 3 and 4: Students grouped around the circular track testing equipment.

of these gentlemen did a bang-up job of taking part in floor discussions at frequent intervals What the more distant states lacked in numbers was partially made up for by their active participation in discussion.

As to representation by companies, the General Crushed Stone Co., Easton, Penn., had 16 representatives, which was the largest any company sent and, in this group, were many "old timers" and higher bracket executives as well as some men new to the industry. The North American Cement Corp. was next with eight representatives; New York Trap Rock Corp. had 7; Superior Stone Co., 7; Standard Lime and Stone Co., 6; New Haven Trap Rock Co., 5; Franklin Limestone Co., 4; and the Callanan Road Improvement Co., 4—to name those companies which sent four or more students to the school.

At the outset of the class room sessions each person was given a kit containing many pamphlets and booklets of a technical nature that might be called the text books. As practically all of these papers have been previously reviewed in print, or have appeared in various publications, and as bulletins of the National Crushed Stone Association, we are not going to review them again here. In the floor discussions these papers were referred to as "source" material for more detailed information regarding the subjects being discussed, so that the salesman could have at his finger tips some highly technical data to use in presenting his sales talk to a client. In this manner an attempt was made to bring up-to-date, and to point to the availability of future needed technical information. As all engineers know, the public library contains books in which a vast amount of technical information is available, but a layman might not know just where to start when looking up basic information. These pamphlets, in a sense, were intended to be used, and saved, by the student salesmen, as a little private library wherein they can quickly refer for needed information.

All the subjects were kept strictly on a technical basis and at no time were there any talks or speakers that dwelt on salesmanship in its broad general sense, or the so-called "inspirational talks!"

On page 118 of the January, 1948, issue of ROCK PRODUCTS was published the complete program of the school's course along with the speaker's name, and his subject. The program was carried out exactly as outlined in that issue.

On the evening of the first day's session, a get-together party was held by the National Crushed Stone Association at the Mayflower Hotel. The purpose of the party was well justified, and the friendliness and conviviality of the group attested itself to the fact that a salesman's assets must include more than cold, scientific facts. Probably each student went home with a couple of new stories that may, in the

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Durability

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ble alkali silicates, more especially sodium silicate, as contained in the book "Soluble Silicates in Industry," by James G. Vail, published in 1928, may eventually change ideas on this subject. This is another source of information that appears to be little known to cement and concrete researchers.

In this connection may be mentioned an artificial stone invented by Ransome in England about 1850 in which blocks were made of compacted aggregates, temporarily bonded with sodium silicate. These were immersed in a hot solution of calcium chloride, with a result said to be a binder or cement of calcium silicate, and the sodium dissolved out as sodium chloride, or common salt. This reaction is definitely probable, and proves that the addition of calcium chloride to a portland cement may sometimes actually improve its cementing value. Another reference to the value of alkali silicates in cements is contained in Gillmore's "Limes, Hydraulic Limes and Cements," published in the early 1870's, where it is stated that any lime may be converted to an hydraulic lime by the addition of sodium or potassium silicate. We will return to the subject of alkalies in portland cement later.

Another reason exists for believing that hydraulic cements high in alkalies may be good cements. In General Gillmore's time the American natural cement known as Rosendale, from upper New York State, was in high favor and in competition with imported European portland cements. Rosendale cement is high in both alkalies and magnesia, yet concrete seawalls made with it around fortifications on Staten Island, New York Harbor, are said to be in excellent condition after 80 years in sea water. This cement was mildly burned; and the experience proves that magnesia in hydraulic cements is not harmful unless "dead-burned" as in present-day portland cements. Many European engineers of that day were convinced that cements high in magnesia were more resistant to sea water than portland cements.

The raw mixtures of early American portland cements were definitely designed to have an excess of siliceous or argillaceous materials because the danger of delayed hydration of the hard-burned free lime was recognized. The temperatures used in making clinker were probably about 2500 deg. F., or some 500 deg. less than in modern practice. Also, kilns were much shorter, seldom more than 60 ft. long, and therefore the time of calcination was less. The result was that there was much less tri-calcium silicate and more di-calcium silicate than in present-day portland cement clinkers.

To guard against uncombined or free lime in clinker, it was customary

Concrete overpass spanning the Pennsylvania Turnpike

to sprinkle hot clinker with water sprays, and to store or "season" it in open storage for weeks or months. This resulted in hydrating the free lime which made it harmless, if not positively beneficial. Also, it was customary to store or "season" the cement itself before shipment. The storage bins then used were rectangular and relatively shallow, which permitted far more access of air to the stored product than the present deep, tight silos.

I have a theory that the free hydrated lime in these old portland cements may have been beneficial because some of the uncombined argillaceous material being underburned, as judged by present practice, would have been little more than a puzzolan, and hence available to combine with the hydrated lime after it had been made into mortar or concrete. No one has yet been found who says this would have been impossible.

Another difference between the early portland cements and the present-day product was less fine grinding and that in open circuit. Without debating the question of whether or not the 30 percent or more of the product larger than No. 200 mesh was any good as cement, it is a fact that the particle size gradation from fine to coarse was far nearer an ideal grading for close packing of particles than the present product which is practically all through No. 200 mesh and most of it a great deal finer.

These early portland cements were slower hydrating and consequently in attaining strength, but some of them seem better to have held the ultimate strength of the concrete, which maybe possessed more toughness and was less brittle than present-day concrete. Perhaps one of the best arguments for their good qualities is the concrete construction in connection with the Panama Canal, which is said to be in excellent condition. This was a portland cement, underburned by modern standards, higher in magnesia and probably higher in alkalies than the U. S. War Department engineers would permit to be used in similar works today.

About 1910 engineer users of cement began to demand "hard-burned" clinker. There had been considerable unfortunate experience with unsound cement caused by free quicklime, probably more from improperly seasoned clinker than under-burning. Hard burning, however, was more necessary when portland cements began to be made extensively of artificial mixtures of limestone and clay or shale, apparently because of lack of intimate mixing and lack of fine grinding of the raw materials, and probably the actual chemical and physical nature of the ingredients themselves. The Lehigh natural cement rock contains the necessary ingredients so intimately mixed and of such nature as to require less burning than these artificial mixtures.

When demand for harder burned clinker arose, no discrimination was made, and the Lehigh Valley manufacturers, according to correspondence published in *Engineering News* about that time, found that they could not burn their raw material any harder without fluxing the clinker, which was destructive to the kiln linings, and also violated the A.S.T.M. specification of the period that clinker was to be brought to the point of "incipient fusion," rather than fused. They shortly discovered the only practical way that their clinker could be harder burned was to add a few percent more lime. This also made the clinker more friable and easier to grind. And engineers found that the higher limed cements were faster hardening and attained desired strengths sooner. The possibility that these cements might

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Chemist Corner

Controlling Clinker Composition

Quicker method devised for determining raw mix adjustments required to compensate for changes in fuel

By C. J. KNICKERBOCKER

A CEMENT CLINKER control problem that is believed to be peculiar to only a small part of the industry is described herein. Involved is the use of mixed fuels, one of which is coal, of varying proportions, with short time intervals between fuel ratio changes, and varying amounts of feed in the kilns.

It is not uncommon in certain sections of the country that plants be required to change kiln fuel at certain specified times of the year but the change is usually a complete reversion. The use of mixed fuels often presents a critical quality control problem and may result in decreased life of the refractory lining.

When several kilns are in use, some fired with coal and the balance with gas or oil, unless a different composition raw mix can be fed each of the kilns, the solution most likely would be to establish a control for all kilns that is based upon the relative production of each unit, in order to obtain the desired product when blended.

The case under consideration is one in which one or more kilns use the same fuel, mixed or otherwise, the principal concern being the changing of the mix control to meet the requirements imposed by rapid, unforeseen fuel ratio changes. In the following method for estimating mix control changes, only the lime content of the raw mix and the clinker are considered. Allowance for compound composition variation due to the deposition of acidic constituents of the coal ash is ignored. Experience with analyses of clinker containing ash in different amounts will provide information on this point.

It is necessary that the amount of feed entering the kiln and the amount of coal being burned both be known within reasonably close limits. This usually is the case. Knowing the above, analyses of calcined raw mix and corresponding kiln clinker will establish the degree of coal ash contamination for given sets of conditions, and the others in the operating range may be calculated. It may be here observed that the conditions set forth in either the third or fourth paragraph above would impose less of a problem in plants that were equipped with small or multiple kiln storage units, allowing introduction of raw mix of the proper composition into the kiln on short notice.

Table I is based upon a constant maximum coal mill output and indicates the relative percentages of ash introduced for a definite feed range.

CONSTANT COAL MILL OUTPUT

Units Feed	Total Output	Bbl. Ash Introduced	Raw Mix Clinker	% Ash Introduced
9	2900	58	2842	2.00
8	2584	58	2526	2.25
7	2268	58	2210	2.56

Table I: Relative amounts of ash introduced

Table II shows the variation in potential raw mix clinker lime required for three production rates, each of different ultimate clinker lime requirement. Constant coal mill output is assumed required.

LIME-FEED VARIATION

Units Feed	Clinker CaO Desired	Raw Mix CaO Design	Difference
9	65	66.3	1.3
8	66	67.5	1.5
7	67	68.7	1.7

Table II: Variation in potential raw mix clinker lime

Table III (opposite page) reveals what would result in the case of an all coal fuel, Type 3 clinker operation, if the fuel ratio was varied from one extreme to the other with no change in raw mix control. The second and third columns give clinker values that are extremely over-limed; shown below each are the proper controls.

Table IV sets forth the results of a fuel ratio change in the opposite direction with a supposed Type 2 clinker operation in progress. An underlined clinker results. The last column of data indicates the added control change required if the production is also varied.

Special Clinker Types

It is evident that special clinker types requiring close lime and compound control cannot be made under the conditions set forth without considerable loss of production and delay unless adequate raw mix storage facilities are available to allow rapid kiln feed control changes being made.

A rapid means for estimating the needed control for certain kiln operating conditions is given in Graph I. This method of solution holds only for the ash contamination and for the kiln conditions assumed above. The effect of the coal ash as a diluent only is considered. Verification by means of chemical analyses will be found essential.

Table V values are used for construction of the network of the graph, the balance being a simple alignment chart. A rapid, relatively accurate solution is afforded.

Graph I operation:

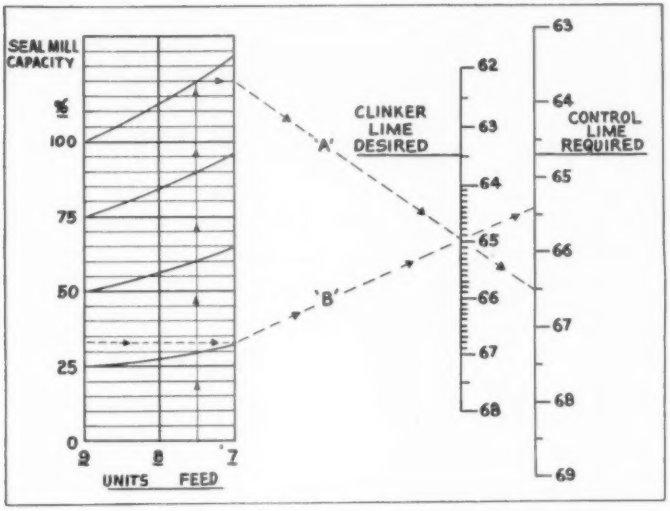
Enter the chart at the feed units value and move vertically to the curve representing percentage of coal mill capacity utilized; move horizontally to right hand ordinate. Align the latter point with the value of desired kiln clinker lime on the diagonal and extend to approximate lime control value required on right hand scale.

Example of use:

1. Given values of feed units, percent of coal used and desired lime as of top row Table VI, follow 7½ unit feed ordinate to 100 percent coal curve; move to right hand ordinate; use alignment chart as by line 'A.'

2. To correct for feed and fuel changes, follow lines as illustrated that terminate in line 'B.'

Graphical values agree sufficiently well with those by arithmetical calculation to justify their use. The extent to which one may rely upon the theoretical correction values may best be learned from experience with the described operation.



Rapid means for estimating needed controls for certain kiln conditions

	Variable Coal-Gas Ratio		
	All Coal No Gas	½ Coal ½ Gas	No Coal All Gas
% Ash	2.56	1.28	0.0
Control CaO	68.7	68.7	68.7
Desired CaO	67.0	67.0	67.0
Actual CaO	67.0	(67.9)	67.0
Needed CaO	OK	67.9	(68.7)

Table III: Results of varying fuel ratio between extremes

9 units feed	Variable Coal-Gas Ratio			8 units feed
	All Gas No Coal	½ Gas ½ Coal	No Gas All Coal	No Gas All Coal
% Ash	None	1.0	2.0	2.25
Control CaO	64.0	64.0	64.0	64.0
Desired CaO	64.0	64.0	64.0	64.0
Actual CaO	64.0	(63.3)	(62.7)	(62.4)
Needed CaO		64.6	65.3	65.6

Table IV: Results of fuel ratio change with type 2 clinker

Units Feed	Factors for Varying Coal Ash Deposit				
	0	25	50	75	100
9	0.0	0.50	1.000	1.50	2.00
8	0.0	0.56	1.125	1.69	2.25
7	0.0	0.64	1.280	1.92	2.56

Table V: Factors for varying coal ash deposit

	Illustration			
	Feed	% Coal	Desired CaO	Required CaO
Original	7½	100	65.0	66.5
Correction	9	33	65.0	65.4

Table VI: Example of use

Current Re-employment Rights of Veterans

Re-employment rights accruing under the Selective Service Act of 1948 to persons completing terms of service in the armed forces, in general, are similar to those that prevailed under the old Selective Service Act, but with a few important changes, according to the Bureau of Veteran's Re-employment Rights, Department of Labor. Re-employment rights are applicable to Army, Navy, Air Force, Marine and Coast Guard personnel including members of women's components, now integrated into the regular armed forces. Rights under the new act do not extend to personnel of the Merchant Marine.

Persons who satisfactorily complete their periods of training or service are entitled to be restored to their former positions (other than temporary positions) on application for re-employment within 90 days after being relieved from such training or service or from hospitalization continuing after discharge for not more than a year and may not be discharged from such restored position without cause within one year after restoration.

The employee must be restored to his former position if he is still qualified to perform the duties thereof, or to a position of like seniority, status and pay. If the employee is not qualified to perform the duties of the position by reason of disability sustained during his term of service or training in the armed forces, then he must be restored to such other position, the duties of which he is qualified to perform, as will provide him like seniority, status and pay or the nearest approximation thereof. No duty rests on the employer if his circumstances have so changed as to make it impossible or unreasonable to re-employ the employee.

The employee should be restored without loss of seniority and is entitled to participate in insurance or other benefits offered by the employer pursuant to established rules and practices relating to employees on furlough or leave of absence in effect with the employer at the time the employee was inducted.

Re-employment rights are applicable to enlistees and reserve personnel as well as to persons who may be inducted. Altough persons may not be inducted within 90 days after June 24, 1948, the effective date of the new draft act, those voluntarily enlisting or called to active duty subsequent to that date are entitled to re-employment rights and benefits conferred by the Act, subject to certain limitations on length of service.

Changes Name

Potts-Moore Gravel Co., Waco, Tex., has changed its name to the Central Texas Gravel Co.

Slackline Cableway Employed In High Bank Deposit

Excess loading on primary conveyor over delivery rate to plant by second belt conveyor is means of building surge pile in order to guarantee uninterrupted flow to plant of J. W. Peters & Sons, Inc.

By DAVID MOCINE

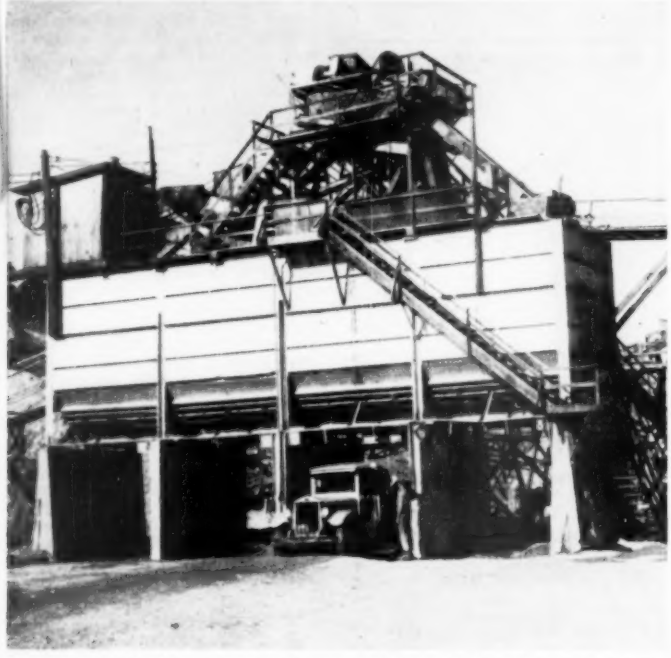
APPROXIMATELY 1400 tons per day of sand and gravel are produced from a 200-ft high terminal moraine deposit at the plant of J. W. Peters & Sons Inc. near Burlington, Wis. Ninety-nine percent of all gravel in the deposit is under 10-in. in diameter. Material, as delivered to the primary hopper by a slackline bucket, is transferred to the plant over two belt conveyors with a total length of 285 feet.

The primary crusher is fed from the hopper, the product is screened and the oversize is put through a secondary crusher closed-circuited with this screen. The second screen is located above a five-compartment truck hopper, as are two sand screws and a dewatering tank. Three sizes of sand are normally produced at this plant.

Drag-Scraper Recovery

A three-drum hoist powered by a 60-hp. motor operates the drag scraper, with one drum used for positioning the bridle assembly at any point on the 250-ft. head line across the top of the pit being worked. Distance from the bridle assembly to the bucket discharge hopper is 350 ft. The hopper receiving pit run material is a permanent installation consisting of two concrete silos, one mounted over the other, each approximately 14-ft. in diameter. These are poured-in-place silos, with an opening on the pit side of the top one to accommodate the scraper. A flat rail grizzly with 10-in. openings covers the top of the silo. A 2-ft. x 10-in. slot has been cut in the concrete floor of the upper silo to allow material flow to a pan feeder for transfer to a grizzly with 2-in. openings set at 45 degrees.

Throughs from the grizzly fall to a 20-in. belt conveyor on 180 ft. centers, while oversize is chuted to a 12- x 36-in. jaw crusher that is set for 2-in. opening and powered by a 35-hp. motor. Feeder, grizzly, crusher and tail pulley on the belt are housed in the lower silo, which has a 14-ft. high by 8-ft. wide door on the opposite side from the pit for belt entry etc. The feeder is driven by a power take-off from the belt conveyor tail pulley. A pump, driven by flat belt from the crusher fly-wheel, is available to keep the crusher pit free of water in wet weather.



Five-compartment truck hopper with a total capacity of 400 ton. Final screen is mounted, top, with dewatering screws and tank to the left

Reserve Surge Pile

Minus 2-in. material from the grizzly and the crusher is elevated a distance of 50 ft. by a 20-in. belt conveyor on 180-ft centers. This conveyor which also drives the pan feeder, is powered by a 30-hp., 1800 r.p.m. motor V-belt-connected to a counter shaft that is connected to the conveyor head pulley by a chain drive. Discharge point of the belt is 30 ft. above grade and over a silo, grizzly, and feeder arrangement similar to the bottom one at the primary installation. The second feeder is driven by a power take-off from the second conveyor. A surge pile of 35-cu. yd. capacity is maintained at the transfer point by virtue of operating the first pan feeder at a slightly faster rate than the second. This surge pile enables the plant to continue operation during

short periods when the drag scraper is down; or during the time the pit is not operating due to oversize boulder removal.

The second belt elevates material to a 3- x 8-ft. double-deck vibrating screen with 1½-in. mesh on the top deck. At present this unit is being used as a scalping screen and so has no cloth on the lower deck. Oversize, plus 1½-in. material, is chuted to an 18-in. intercone crusher, set for ⅝-in. discharge opening. This crusher discharges onto a 20-in. transfer conveyor for return to the second conveyor in closed circuit. Throughs from the first screen fall to a 20-in. belt on 118-ft. centers which discharges over a 3- x 10-ft. triple-deck vibrating wash screen with 1-in. and ⅜-in. mesh on the top and second deck respectively and ⅛- and ¼-in. mesh on a divided bottom deck. This screen is mounted above a five-compartment steel truck hopper. Wash water is provided by a 4-in. discharge pump rated at 275 g.p.m.

Sand Processing

Oversize from the top deck, plus 1-in., is chuted to one of five compartments in the steel truck hopper of 400 ton total capacity. Gravel retained on the second and third decks discharges into additional compartments. Throughs from the two sections of the bottom deck are chuted to sand dewatering screws, with provision by means of a flop gate for sending all or any part of the minus ⅛-in. material either to the sand screw or to a dewatering tank. Underflow from the tank is flumed to one side of the structure where it falls to a stock pile. Underflow from either sand screw, minus ¼-, plus ⅛-in. or minus ⅛-in. material, can be chuted into separate compartments in the truck hopper, or by provision of a flop gate, they can be mixed in any desired proportions. Overflow from both screws as well as the tank are flumed to waste on the opposite side of the plant from the masons sand stockpile. Production in excess of capacity of the five compartment hopper is trucked to stockpiles.

J. W. Peters is head of the company, and his sons, Jerome and Harold, manage the gravel operation and the excavation and hauling contacting business, respectively. The two operations dove-tail into each other, with some of the same equipment being used in either work. Also many sales of aggregates are to outside contracting contacts.

Equipment

Mechanical equipment for handling finished material includes a Hough 1-cu. yd. rubber-mounted Payloader; a Caterpillar D-4 crawler-type tractor with Trackson loader and dozer attachment; and six 3- to 5-ton dump trucks, one White and five Diamond

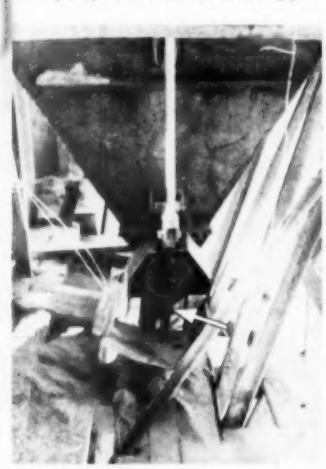
This versatile rig, used for loading trucks from stockpiles and clean-up around yard, here pulls a large consolidated clay ball off the grizzly over the receiving hopper. These "boulders" occur occasionally in this deposit. Note bottomless bucket, lower left

Looking back to the pit, upper center, from the primary screen. A dragline operates in the pit, discharging to the first silo, under which the primary crusher is located. Surge pile, center left, is built-up under discharge point of first conveyor to assure the plant of uninterrupted material flow. Belt conveyor, lower right, returns secondary crusher discharge to main belt for delivery to first screen, completing a closed circuit

Mr. and Mrs. J. W. Peters, with sons, Jerome, left, and Harold, right. Ethel Mohr, second from right, is company record keeper

T. The company also engages in contract excavation and road building, and has a ½-cu. yd. General gasoline-powered shovel that is sometimes used in loading material from stockpiles.

The drag scraper, bottomless bucket installation was manufactured by Sauerman Bros., Inc. Lippmann Engineering Works provided the jaw crusher, the first or dry screen and both sand screws; while Smith Engineering Works manufactured the pan feeders, the secondary crusher and the dewatering tank used for masons sand recovery. The washing screen is a Diamond Iron Works Mogul screen, and the truck hopper is of Blaw Knox Co. manufacture. Water for all plant operations is supplied by Layne Northwest pump that is rated at 275 g.p.m.



Underflow from the dewatering tank, arrow, masons sand, is flumed to a stockpile adjacent to the truck hopper, over which the tank is mounted

South American Cement

WHOLESALE PRICE of portland cement in Chile has been increased from 38.40 paper pesos ($1.23) to 39.33 paper pesos ($1.26) per bag of 42.5 kilograms, net weight, by the Ministry of Economy and Commerce. This is an increase of approximately 2.4 percent. As a result, retail price of portland cement also has been increased. In Santiago, lots of less than 60 bags are sold at 49.70 paper pesos ($1.60) per bag of 42.5 kilograms net weight, and lots of over 60 bags at 49.10 paper pesos ($1.58) per bag.

Acute shortage of cement in Ecuador has motivated the government to encourage greater production by granting a concession to two affiliated cement producers to exploit gypsum deposits in Guayas Province.

Because of an unprecedented building boom in Uruguay, scarcity of cement is still a problem. Although there are two large plants in the country, the largest of which is a subsidiary of a United States company, the recent shortage has prompted the Government to consider building a plant of its own. This would be located in Paysandu, using the limestone found in the deltas where the River Quequay meets the River Uruguay. It would also process fertilizers as a by-product. According to present plans, the Government, through Administración Nacional de Combústibles, Alcohol y Portland, would take half of the ordinary stock issued. The city of Paysandu and private investors would divide the other half equally. Preferred stock would have a guaranteed minimum interest of 5 percent and be of the participating type. Cement sold to the public works could not be sold for more than cost plus 10 percent.

Two private firms are making portland cement in Uruguay: Compañía Uruguaya de Cemento Portland and Compañía Nacional de Cementos. The older cement company in Uruguay has its deposits at Minas, its plant at Calle Laguna, Montevideo, and is at present working at 100 percent capacity. It employs over 300 persons for 4-kiln operation. It turns out standard and "high early strength" portland called "Artigas" and "Incor," respectively by the wet process. Capacity was 1,442,758 bbl. for the first 10 months of 1947. The second company employs 80 persons in the manufacture of white portland as well as standard by the wet process. It has one kiln, and is located in Pan de Azúcar. Production for the first 10 months of last year was 164,152 bbls.

Moderate rationing of cement was undertaken by the Compañía Uruguaya de Cemento Portland in September, 1947, when the scarcity was greatest. The system devised was to give each dealer 90 percent of his average order for May, June, and July. As national consumption of portland cement equals national production minus exports, this produced a "gray market" with a 50-kilogram bag often selling for double its real value. Moreover, press reports on the seriousness of the situation in various parts of the interior led the Government to issue a decree demanding that all private holdings of more than 250 kilograms be declared.

In Venezuela, the Board of Directors of the C. A. Venezolana de Cementos has decided to double the production facilities of the plant in Maracaibo, which has been producing 7000 to 9000 bags per day. The firm also has a plant in operation at Barquisimeto, producing 1000 sacks daily. The above information was obtained from *Mineral Trade Notes*.

Colorado Fluorspar Deposits

RELEASE of a preliminary report on fluorspar deposits of the Northgate district, Jackson County, Colo., has been announced by Geological Survey Director W. E. Wrather. The investigations were carried on under the cooperative auspices of the U. S. Geological Survey, the Colorado State Geological Survey Board, and the Colorado Metal Mining Fund. Total indicated and inferred reserves of fluorspar, containing more than 35 percent and averaging about 45 percent of CaF_2, are estimated at approximately 500,000 tons. Geologic maps accompany the report, which is listed as "Strategic Minerals Investigations Preliminary Report 3-220." Copies may be obtained from the Director, U. S. Geological Survey, Washington 25, D. C.

Opens Gravel Pit

CLARENCE IMUS has announced plans to operate a gravel pit near St. Edward, Nebr. The business name is St. Edward Sand and Gravel Co.

Portland Cement Discussed by A. I. M. E.

AT THE February meeting of the A.I.M.E., held in San Francisco, there were several papers of interest to the portland cement industry. One was a short description of the Lepol kilns at the Santa Cruz Portland Cement Co. plant at Davenport, Calif., by Robert A. Kinzie, Jr., works manager for the company.

The Lepol kiln installation at this plant has been described before in ROCK PRODUCTS (December, 1945, pp. 81-82) so we very briefly abstract from his description for the benefit of our readers who may be unfamiliar with this type of kiln. Some of the operating data and results gained after several years of operation, however, will be new information to our readers.

In the Lepol kiln, the raw material is rolled up into small balls with water in a nodulizer and is then fed to a traveling grate on which it is dried and partially calcined before being fed into a short kiln. This is in contrast to the use of long kilns with chains in wet process plants and waste heat boilers in dry plants, for fuel conservation.

At the Santa Cruz plant, the Lepol installation has achieved a fuel economy of 4.7 gal. of oil per bbl. of clinker or 704,000 B.t.u. (gross B.t.u.) per bbl. as compared to the old kilns which consumed 7.8 gal. of oil or 1,130,000 B.t.u. per bbl., using the same fuel and raw material. Average consumption for 1948 was 708,000 B.t.u per bbl. of clinker from the Lepol, based on cement sold and oil purchased.

The nodulizer (see schematic drawing) is an 8-ft. 10-in. cylinder 18 ft. long, rotated at 10 r.p.m. The drive draws about 9 kw. The inside of the shell is cleaned by a scraper drawing 0.1 kw. Spheres formed in the nodulizer contain 15 percent water and some 90 percent are ⅛ to 1 in. in diameter. Hot gases from the kiln are pulled through the nodules and grate upon which they fall, to exhaust. The grate is 47 ft. 6 in. on centers, 12 ft. 5 in. wide and has an open area of 40 sq. ft. It travels at 32 in. per minute and carries a 6-in. bed of nodules. The drive, a 15-hp. motor, draws 5 kw.

The kiln is 11 x 112 ft., with a slope of ⅞ in. to the ft., and is driven by a 40-hp. motor drawing 21 kw. The main fan is driven by a 125-hp. motor drawing 76 kw. Overall power consumption of the nodulizer, grate, kiln and exhaust fan is 1.25 kw.h. per bbl. of clinker. Labor required is some more than for normal kilns but should not exceed $.03 per bbl. of clinker, and repairs are low. Instruments are more extensively used than with conventional kilns. Their locations are indicated in the accompanying drawing.

Cement in Northwest

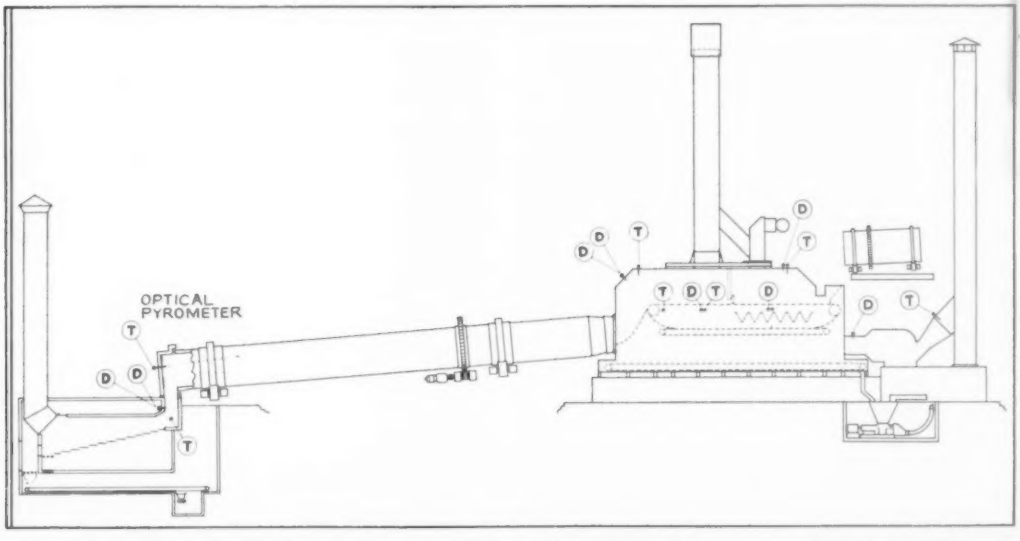
"The Present Shortage and Future Outlook of Portland Cement in the Pacific Northwest," was the subject of a paper by K. E. Hamblen, consulting engineer of Portland, Ore. Mr. Hamblen's paper considered the critical shortages of cement in the area with a view to whether or not new plants or increased capacity in existing plants might be justified. Much of his presentation had to do with the economic and geographical factors which determine where a plant may be profitably located.

Increased portland cement supply into the Pacific Northwest must come from within the area, he said, except for possible water-borne cement from Europe or California. In view of demand in California itself and the multiple basing point price ruling it is unlikely that the practice of dumping California cement into the area will be revived. One of the reasons cited for the great demand is a population growth of 40 percent in an 8-yr. period.

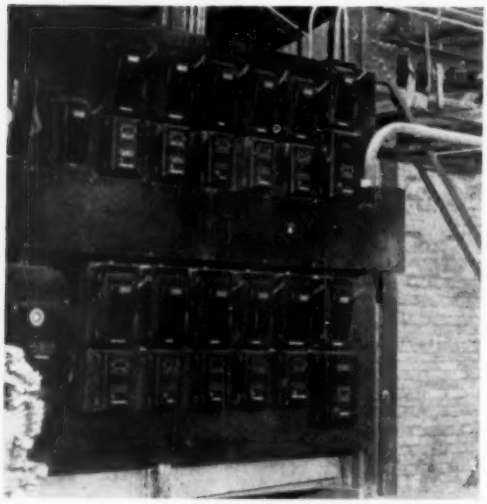
Raw material supply is one of the serious obstacles to establishment of new plants and, as pointed out, a medium sized plant must require 300,000 tons of limestone annually or a proved tonnage of 15 million tons to justify a plant. The principal limestone areas in Washington are north and east of Seattle and north and west of Spokane. Deposits in the Puget Sound area are of good quality but many of the deposits north and west of Spokane are dolomitic and extremely variable in silica.

Good quality stone is available in northwestern Oregon and in southern Oregon where, however, they are too remote from rail connections. One area of low-grade limestone 60 miles south of Portland is said to offer promise but would require flotation which would raise its calcium concentrate to 93 percent from a quarry run average of 55 percent.

(Continued on page 100)



Outline diagram of Lepol kiln installation showing various points at which temperature and pressure are determined. Temperatures are measured by thermocouples at the points indicated (T), and pressure points are indicated (D)



Electrical control panel, located near valve packer, that carries a switch governing every motor in the plant

Canadian Fine Grinding Plant

New fine grinding plant of Winnipeg Supply & Fuel Co., Ltd., Winnipeg, Canada, has mechanical feeders, classifiers, ball mills, rotary dryers and valve packers.

By E. P. PEARSON

VERSATILITY is the keynote in design of the fine grinding plant operated by the Winnipeg Supply & Fuel Co., Ltd., Winnipeg, Canada.

As well as heading the field in the sale of coal, lime and building supplies in the Province of Manitoba, this company has supplied finely ground non-metallic minerals in this area for over 15 years. When demand finally exceeded output of the antiquated mill then in use, engineers were called in to design a plant capable of producing products, chiefly limestone, in quantity, ranging from 3 to 200 mesh.

Limestone Deposit

As most of the Province of Manitoba is situated on either Silurian or Devonian limestone deposits, little agricultural limestone is required in the vicinity and so it has been necessary to develop a demand for poultry grit and fine-ground calcium carbonate for use in animal feeds. Raw stone for these products is shipped from the Company's high calcium limestone deposits at Moosehorn, Manitoba, which tests over 96 percent $CaCO_3$. Dolomite from the Stonewall quarry is reduced at the new plant to minus 200 mesh and sold chiefly as an asphalt filler in the roofing industry. Talc and shale have been processed quite successfully also, but not in large tonnages. Overall capacity of the plant averages over 3 t.p.h. of dried, fine-ground material.

Material Flow

Quarry-run stone is reduced to minus 6-in. size at the various quarries and shipped to the plant in side-dump railway cars. These cars are unloaded on to a 26-ft. belt conveyor which carries the stone either to stockpiles or to an 8- x 16-in. jaw crusher. Output of this crusher, minus 2-in. material, is elevated to a 50 ton storage hopper. Discharge from the hopper is controlled by a 30-in. disc feeder, which proportions the flow to a 30-ft. x 48-in. Ruggles-Cole rotary dryer. The coal-fired boiler is equipped with a stoker.

Dryer discharge is chuted to a 24- x 18-in. hammer mill with adjustable grate bars that can be set to pass material from ⅛ to 2 in. in size. The hammer mill discharge is elevated to a triple-deck vibrating screen. An interesting feature of this screen is an easily interchangeable fitting over the discharge end that diverts the different sizes to the required bins. Because of the many sizes required at this operation, a system of chutes and flop gates would be too complicated.

A loop classifier in circuit with a 6-ft. x 36-in. ball mill has proven quite satisfactory at this installation. Classifier feed is minus 20 mesh and is controlled by a 2-in. volumetric drum feeder. Oversize from the classifier is returned to the ball mill and is controlled by a constant weight feeder.

Packing

All minus 20-mesh products are transferred from their various surge bins to a two-tube packer by a screw conveyor and packed in valve-type bags. All granular products are packed in open-mouth bags from manually-controlled filling chutes.

As is usual in dry grinding, dust has been a serious problem. Within the mill all circuits have been closed and conditions are quite good. Dryer exhausts, in spite of two cyclone dust collectors in series, carry a good deal of dust, but rather than go to additional expense for added dust removal equipment, the Company has installed a high stack which carries smoke and dust well away from where it would constitute a nuisance.

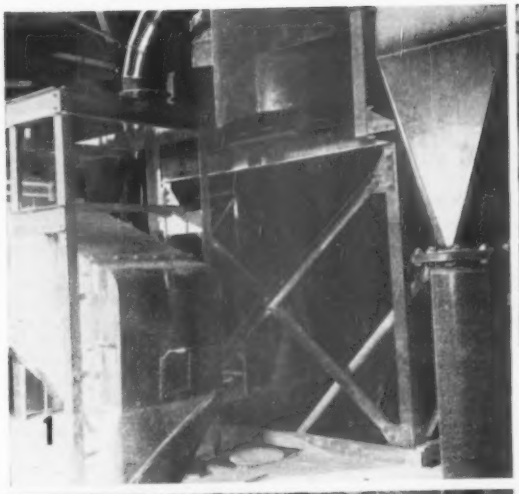
Year Round Operation

Operation of this mill is a year-round proposition, and is subject to the usual extremes of Canadian weather. In winter, temperatures of 30 deg. below zero are often experienced. The difficulty of drying stone mixed with a certain amount of snow at these temperatures presents a definite problem. Lubrication also becomes more difficult, especially when starting after a "cold night." At such times each machine must be carefully watched until it reaches its usual operating temperature.

Equipment

Bertrand Robinson, engineering representative of the Hardinge Co., was in charge of designing the new plant. Hardinge equipment includes the disc, volumetric drum and constant weight feeders; the loop classifier and the ball mill. The hammer mill is a Jeffrey Pulverizer, a Dillon screen is used and a St. Regis valve-packer.

General plant pictures on facing page, No. 1: Triple-deck screen, left foreground, has detachable cover at discharge end that is easily adjusted to direct different sizes of stone to desired bins. Dust collectors, background, are in classifier circuit and dryer exhaust. No. 2: Directly behind bagging chutes for granular products, left, are volumetric feeder to loop classifier and constant weight feeder to ball mill. No. 3: Loop classifier. No. 4: Furnace end of rotary dryer, with raw storage hopper and disc feeder, arrow. No. 5: Discharge end of dryer. Material falls to hammer mill, arrow, Elevator, left, carries stone to the screening station. No. 6: Centrally located valve packer enables operator to watch all ground-floor machinery. Switch panel, to operator's right, controls every motor in the plant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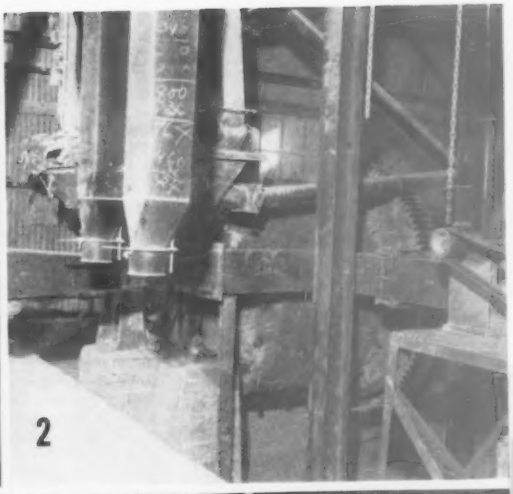
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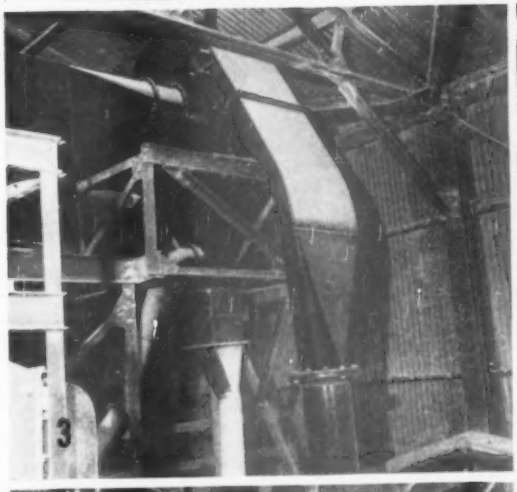
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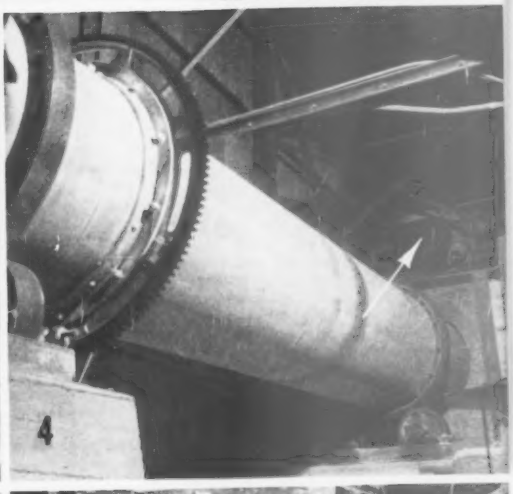
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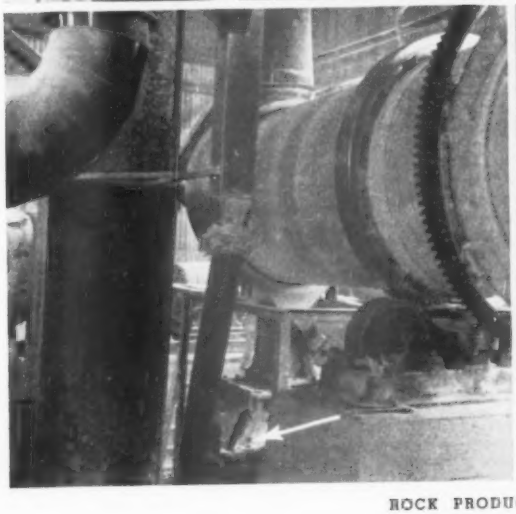

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Non-Metallic Minerals in the Southwest

Papers presented ranged from potash, pumice, barite and fluorspar to coal and uranium ores

By JAMES A. BARR, Jr.

REPRESENTATIVES of all phases of the mining industry of the Southwestern states met in Santa Fe, N. M., February 10-12, 1949, at the convention of the New Mexico Miners and Prospectors Association. Papers and discussions ranged from the mining of coal to the intensively exciting search for uranium minerals and to the minerals most responsible for stable mineral wealth in New Mexico —potash, pumice, barite, fluorspar.

U. S. Minerals Research Program

Dr. James Boyd, director, U. S. Bureau of Mines, Washington, D. C., in his speech, "The Bureau of Mines' Place in Minerals Research," outlined the role which should be followed by the federal government in its cooperative program with private enterprise. Director Boyd gave considerable encouragement to operators who are earnestly trying to prove new mineral resources and extend present reserves. There seems to be some hope for assistance for those who wish to attract more risk capital to the mining industries. "Technology has been the secret of our phenomenal national growth and in this field of research the U. S. Bureau of Mines has maintained a position of eminence," he said.

The importance of national research is known to everyone today. The Board of Scientific Research divides research into four categories: basic, background, applied research and development. Although the Bureau of Mines embraces all four categories to some extent it is primarily concerned with background research. Such activities are exemplified by Bureau work in analyzing minerals; the collecting and publishing of analyses of ores, coals and gas samples; the gathering and analyses of mineral production and consumption statistics; and the determination of the limits of flammability of combustible substances.

Pegmatite Mineral Wealth

The Bureau of Mines has for many years assisted in research on pegmatite minerals. However, it is only recently that many have recognized the economic potentialities of pegmatite resources. Such deposits have been important sources of feldspar, mica, beryllium and tantalum as well as other materials. Since the products of pegmatite deposits are becoming of increasing importance, the Mining Division, in conjunction with the Metallurgical Division, is doing extensive work on methods of mining and concentrating the pegmatites as a whole with the hope of separating the various mineral constituents as they exist in complex form.

In New Mexico extensive work has been done on pegmatites containing spodumene and microlite. Dr. Richard H. Jahns, associate professor of geology, Division of Geologic Sciences, California Institute of Technology, Pasadena, Calif., gave one of the most informative papers presented in recent years on the correlation of pegmatite lens formation to mineral occurrence. After extensive study of pegmatites in the Southeast, Northeast and Southwest, Dr. Jahns evolved a definite scheme for the intelligent development of pegmatite ore bodies. Included in the discussion was the use of aerial photography to track down new promising areas of pegmatite occurrence and for directing exploration parties to commercial deposits.

Pumice and Pumicite

The New Mexico Bureau of Mines and Mineral Resources, directed by E. C. Anderson and assisted by Donn M. Clippinger, has been an outstanding example of cooperation between state mineral research facilities and private enterprise.

Donn Clippinger in various studies of pumice resources and uses for pumice and pumicite has guided the new pumice aggregate producers. New Mexico is now first in this new industry. These mineral products and lightweight building units produced from them are a substantial part of the state income from mineral wealth. Pumice aggregate is not only used extensively in the Southwest but is being shipped as far as the East Coastal markets.

Deposits of perlite are being extensively explored and developed. Perlite in its exploded closely sized form is being accepted for use as an insulator and light material for plaster, constructional brick, block and wall units. Mr. Clippinger has many publications detailing research work done under the auspices of the New Mexico School of Mines, Socorro, N. M.

Fluorspar and Barite

E. C. Anderson in his paper, "Progress and Plans of the New Mexico Bureau of Mines and Resources," gave an outline of the extensive work which is being done to assist all those engaged in oil and gas exploration, prospecting for minerals or active mining.

Fluorspar, an extremely important industrial mineral so essential to our atomic age, is being exploited in heretofore uneconomic areas. Fluorspar is the present major source of elemental fluorine and hydrogen fluoride so necessary to the production of refrigeration gas-freon, high compression fuels, separation of radioactive isotopes by gaseous diffusion, fluocarbons — the newest commercial in the field of organic chemistry. Fluorspar is used principally as a flux by the steel industry. Demand during 1948 has been at an all time high. Barite is also being produced in the Southwest and used as a weighting for drilling oil wells.

Potash

One of the most interesting papers was entitled, "Developments in the Potash Industry in New Mexico in 1948," by Parker S. Dunn, resident manager, and Raymond R. Knill, mine superintendent, Potash Company of America, Carlsbad, N. M.

The development of our potash industry during World War I is an admirable tribute to cooperative federal and private enterprise research. From complete dependency on imports to a position of complete independence has been attained in relatively few years. The latest available figures showing production are found in the Thirty-Seventh Annual Report of the State Inspector of Mines. An amount of 4,846,319 tons of potash was produced in the fiscal year ending June 30, 1948. This is an average of over 13,000 tons ore hoisted per calendar day and production has increased somewhat since last year. Of interest is the increased use of potash in the United States. The American farmer and chemical industries now use four times as much potash as was consumed 15 years ago.

To keep up with the expanding demand for fertilizers and for potash chemicals, all potash companies are conducting extensive research and are in the midst of a very significant expansion program which will make available substantially greater quantities of muriate of potash, chemical grade potassium chloride and manure salts. Ninety-two percent of all potash produced by the industry is used in agriculture and 8 percent is used to make other potassium chemicals such as the nitrate, chlorate, hydroxide and carbonate.

Radioactive Coal

There is extreme interest today in the scramble for fissionable minerals. Dr. John H. Manley, technical associate director, Los Alamos Scientific Laboratory, University of California, Los Alamos, N. M., in discussing the subject "Radioactive Coal," gave many useful ways to avoid difficulties confronting those prospectors who are assisting the government in its search for radioactive ores.

The new ideas for industrial power from fissionable materials were most exciting. There is a possibility that we may be able to regenerate nuclear energy through the revolutionary "breeding process."

Incentive for the Explorer

Relief for the venturesome has been a subject much discussed during recent years. It has been exceptionally difficult to induce risk capital into mining properties which must sometimes go through years of research and development before any return is realized.

Robert S. Palmer, executive director, The Colorado Mining Association, Denver, Colo., gave a talk on "Prophecies for the Mining Industry."

The complete program was of exceptional timely interest to those associated with industrial minerals. Other topics and speakers include the following:

"Progress and Plans of the New Mexico Miners and Prospectors Association," Jack C. Pierce, secretary-treasurer of the Association, Albuquerque, N. M.

"Mining in the Santa Fe Area," H. D. Bemis, retired metallurgist, American Metals Co., Santa Fe, N. M.

"And We Still Have Other Non-Metallics," Donn M. Clippinger, mining engineer, New Mexico Bureau of Mines and Resources, Socorro, N. M.

"Prophecies For the Mining Industry," Robert S. Palmer, executive director, The Colorado Mining Association, Denver, Colo.

"Progress and Plans of the New Mexico School of Mines," William G. Camp, director of instruction, Socorro, N. M.

"Progress and Plans of the New Mexico Bureau of Mines and Mineral Resources," E. C. Anderson, director, Socorro, N. M.

"Radioactive Coal," John H. Manley, technical associate director, Los Alamos, University of California, Los Alamos, N. M.

"The Geologist in a Program of Mineral Appraisal," Richard H. Jahns, associate professor of geology, Division of Geologic Sciences, California Institute of Technology, Pasadena, Calif.

"Mining Legislation," C. C. Royall, State Senator, Grant County, Silver City, N. M.

Two excellent films were shown by John A. Garcia, state inspector of mines, Albuquerque, N. M.—as follows: "The Air We Breathe," giving the history and development of approved mine safety appliances; and "Montana operations of Anaconda Copper Co.," a film showing the history and development of the "richest hill on earth."

Dr. James Boyd, director, U. S. Bureau of Mines, Washington, D. C., gave his talk at the annual banquet. Of special interest to many was an inspection trip to Los Alamos.

Industrial Mineral Leadership

During the past year under the exceptionally able leadership of George Townsend Harley, the New Mexico Miners and Prospectors Association has enjoyed a year of significant growth. Mr. Harley is general manager of the Potash Division of International Minerals and Chemical Corp. I.M.&C.C. is one of the largest producers of the industrial mineral —potash.

The newly elected president, George A. Warner, is also a representative of the producers of industrial minerals. Mr. Warner is general superintendent of the Zinc Milling Co., the fluorspar subsidiary of the Shattuck-Denn Mining Corp.

Mr. Warner is also part of a very noticeable and significant trend within the metal sulfide and oxide mining industry which is leading outstanding metal producers into the realm of nonmetallics. Principal sources of future mineral wealth are now being recognized as part of those rejected mill tailings, those mill liquors or fumes and the unattractive pegmatite thrust through the crust of our earth.

Safety in Dredging, Hydraulic Mining

A STUDY of accidents and safety practices in dredging and hydraulic mining, both forms of placer mining, has been released by the Bureau of Mines. The study is based on investigations of operations in California and Alaska made during 1946 and 1947. Tables include statistics on employment in the hydraulic mining fields, accidents fatal and non-fatal, and accident frequency for the 10-year period 1933-1942. Safe practices, safety devices, and safety rules are discussed and illustrated. Copies of Bulletin 270, "Safety Practices in Dredging and Hydraulic Mining," may be obtained from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at a cost of 25c.

Re-Open Quarry

EVERETT AND CLARK, contractors, have re-opened their quarry near Cameron, Mo., where they are producing crushed stone to meet state highway specifications for surfacing.

Steel Ball Replaces Secondary Blasting

USE of a two-ton steel ball known as a "skull breaker" for breaking stone instead of secondary blasting at a Pennsylvania limestone quarry has lowered mining costs, proved a time-saver, and reduced hazards among workers, according to an information circular released today by the Bureau of Mines. The 4000-lb. manganese-steel ball, handled by a gasoline-powered crane, is now in use at a quarry operated by the White Rock Quarries, Inc., at Pleasant Gap, Penn., where it is said to have resulted in a savings of 2.7c for each ton of limestone mined. Capacity is 1500 tons per day. Only one man is required to operate the "skull breaker," whereas in secondary blasting, three men are needed. Costs also are cut by eliminating the operation of a compressor, laying of compressed air lines, and the use of explosives, except for major blasting at the face.

Barite Production

A RECORD of 884,219 short tons of barite was produced in the United States in 1947 establishing a new record, according to Bureau of Mines. Primary barite sold or used by producers totaled 834,082 short tons valued at $6,171,342. The average value of primary barite sold or used increased 16c per ton to $7.40. Imports of crude barite were up to 53,222 short tons, a 19 percent increase. Barite sold or used plus imports was 887,304 short tons, 94 percent of which was from domestic sources.

Investigate Washington Limestone Deposits

MINERAL INVESTIGATIONS conducted by the Bureau of Mines on limestone deposits in Washington are described in a new publication entitled "Report of Investigations No. 4355. Investigation of the Sauk Mountain Limestone Deposits, Skagit County, Wash." Copies may be obtained free from the Bureau Publications Distribution Section, 4800 Forbes Street, Pittsburgh 13, Penn.

Sets Safety Record

STANDARD LIME & STONE CO., Woodville, Ohio, recently honored its employees at a dinner in recognition of completing the year 1948 without a lost time accident. This was the 11th year of no lost time accidents for the company.

Cement Company Expands

BRITISH COLUMBIA CEMENT CO., LTD., Victoria, B. C., Canada, has announced plans for construction of a second plant, at Vancouver Island. W. J. Hastie is president of the company.

Pumice Sizing Plant

Aggregate for concrete block manufacture, chicken grits and soil conditioner produced by Chrystalite Aggregates, Chemult, Ore.

By W. B. LENHART

CHRYSTALITE AGGREGATES is located about 66 miles south of Bend, Ore., at Chemult, in the heart of a vast pumice area. Deposits are of comparatively recent geological origin. Volcanic peaks were formed near the western edge of a vast lava plateau that covers portions of Oregon, Washington, and California, making up a large part of the Cascade mountain range. One of these peaks, or remnants of a peak, is Crater Lake, well known to tourists. It accounts for a large amount of pumice in the area. Mount Mazama, the name given the peak that existed at the present site of Crater Lake, at one time was some 12,000 ft. high. A catastrophic explosion, or series of explosions, at this one peak alone is said by some geologists to have produced ten square miles of pumice, with prevailing winds carrying it some 80 miles northeast of the parent mountain. Many other peaks along the eastern rim of the present Cascades also contributed large shares of volcanic materials—lava, pumice, volcanic ash, etc.

Formation of Pumice

Just how pumice is formed in a volcanic eruption is not fully understood; but, some of the basalts and obsidians, when quickly heated to high temperatures will exfoliate, or expand, to several times their original volume, resulting in a pumice-like material. The name Perlite has been given to these artificially expanded particles.

Some pumice is made up of a large group of small cells that might be said to be complete hollow spheres in themselves. These cells are from 1/10 in. in diameter to microscopic sizes. Such a pumice material not only will float on water, but will continue to float indefinitely, absorbing only a small amount of liquid. When such a pumice is used in the manufacture of concrete block, the block will have low water absorption properties. Aggregates of small cells will form rock-like light-weight materials that run from sand sizes up to the size of a water bucket.

Other pumice materials seem to have a tubular construction within themselves, such materials absorbing considerable amounts of water. These materials will float at the outset, but later may sink; hence, block made from this type pumice will have higher water absorption properties.

Chrystalite Aggregates is run as a partnership by Omer, Dennis and Eugene Wisby—brothers, and Alfred J. Schwekke, and is established alongside the Great Northern Railroad on Highway 97, connecting Bend and Klamath Falls. Southern Pacific rail facilities are only about ½ mile away.

At the plant site, two separate and distinct volcanic eruptions account for the pumice deposits. From 7 to 20 ft. of pumice make up the top stratum of ground. Under this are a few inches of sand, and then one more foot of pumice. The basial rock structure under the pumice is uneven and might be compared to a present day rock surface that suddenly has been covered by volcanic dusts of variable sizes.

Material is small in size, most of it being in the minus ⅝-in. range, although there are some larger pieces in the matrix. The material weighs 1400 lb. per cu. yd., and is dull white to light yellow in color.

Chrystalite Aggregates owns 380 acres of ground where the pumice deposits range from 9 to 20 ft. deep. Only the top stratum is mined. There

Front-end loader used in the stockpile area

is little or no overburden, however some large pine trees grow in the vicinity, and the top 18 in. of material usually is so intermixed with pine tree roots that it is carried to one side and dumped. The least bit of wood material causes a root stain that is not desirable.

The company is planning to get a ½-cu. yd. power shovel with a 1¼-cu. yd. bucket for loading. Plans also are being made to install additional belt conveyor equipment to reduce the haul. A dryer may be added for production and shipping in inclement weather.

Pumice is scraped up with a 15-cu. yd. Wooldridge carryall that uses an International TD 18 as the tractor. Pumice often is thought to be hard on equipment, but rollers on the tractor, which has been handling materials over three years, still are in good working condition. According to Omer Wisby, who is superintendent, the carryall loads easily on the down hill pulls. The tractor unit hauls the material approximately 0.4

Crawler-type tractor fitted with dozer that pulls rubber-tired scrapper to haul pumice to processing plant at Crystalite Aggregates, Chemult, Ore.

miles, at 4½-5 m.p.h., to a grizzly made of logs. About 100 cu. yd. of material are delivered per hour. The pit holds 30 cu. yd. of material which is fed by a reciprocating feeder to an inclined belt conveyor on Rex idlers that delivers to a 5- x 12-ft. rotary screen. The latter is driven by a Continental gasoline engine. Only two sizes of material are being produced, a minus ¼ in. and minus ⅜ in. Material over these sizes falls to ground storage and is shipped to compounders of chicken grits and some of the oversize is sold to greenhouses for use in raising orchids and other special plants. Pit-run pumice, when worked into adobe and alkali land, has proved very successful in showing a marked increase of production.

The screened materials fall to a small steel bunker that loads to the gondolas. The company has a 12-car switch on its property. A considerable amount of material is ground-stored, and reclaimed with a Scoopmobile that has a 15-ft. lift and 1-cu. yd. bucket. It loads a 71-cu. yd. gondola in about one hour's time. Capacity of the plant is approximately 5 carloads per day.

Pumice in this area sells for around $1.50 per cu. yd. with freight rates into Portland, Ore., listed at $3.00 per ton; Seattle, Wash., $4.00 per ton; and Sacramento, Calif., $4.40 per ton.

Simplified Practice Recommendation

COPIES of Simplified Practice Recommendation R163-48, Coarse Aggregates, now are available, according to the Commodity Standards Division, National Bureau of Standards. The recommendation deals with sizes of crushed stone, gravel, and slag, coarse aggregates for road building, airport construction and similar uses. The table of sizes, which constitutes the recommendation, gives for each listed size number, nominal size of sieve openings in inches or sieve number, and the percentage by weight of material passing each sieve. A table of typical uses for each of the listed sizes is included as useful information. Copies may be secured from the Superintendent of Documents, Government Printing office, Washington 25, D. C. at a cost of 10c.

Study Profits From Cement Used on Highways

THE ILLINOIS Highway and Traffic Problems commission has asked for an investigation of profits of cement manufacturers on cement used on Illinois highways. The group has suggested manufacturing of cement in state-owned plants for highway construction if the investigation reveals that private plants are taking exorbitant profits from the state.

Air-cooled engine powers vibrating screen at small Scoria reclaiming plant near Los Angeles, Calif.

Scoria Reclaimed For Lightweight Aggregate

H. B. Jarvis, Little Lake, Calif., processes lightweight aggregate for Los Angeles market in small plant

SCORIA or volcanic clinker is a dark colored, rather harsh lightweight aggregate that has excellent structural qualities, especially for light weight concrete masonry units. Scoria deposits are found scattered throughout the West and where they are close to cities, this material is used in relatively large amounts. Denver, Colo.; El Paso, Texas; Albuquerque, N. M.; all use this lightweight aggregate to a considerable degree.

Near Little Lake, Calif., a desert town about 175 miles North and Easterly from Los Angeles, is a huge extinct volcanic cone that dominates the immediate area. Its base, several miles in circumference, is a mass of well broken volcanic clinker. Possibly due to winds and other weather considerations, some sorting of this material has occurred. In the past, efforts were made in a rather feeble way to exploit the deposit, but apparently only for local use. However, this year, Los Angeles block producers are being introduced to this aggregate for the first time. H. B. Jarvis, Little Lake, Calif., has installed some modest equipment and is processing scoria and shipping it into Southern California, under the trade-name of Volcanic Cinder. The site he selected for mining is near the south easterly toe of the cone. Here the scoria is quite thick and relatively small in size and most of the material here is in the ⅝-in. to ¾-in. range. His simple plant consists of a Yaeger, 2 drum hoist that is powered by a Wisconsin gasoline engine and operates a ¾-yd. drag scraper. The material passes through a small set of rolls after which it is sized on a 3- x 6-ft., single-decked, dry, Overstrom vibrating screen that has ¼-in. mesh on it. The sized materials are trucked to Los Angeles markets. The cost of such a haul is said to be $4.00 per ton. The material weighs from 850- to 1250-lb. per cubic yard. Trucks carry up to 34 cu. yds. per load.

At time of inspection the plant was shipping around 100 tons per day and expected to enlarge its processing facilities soon. The deposit is only a short distance off highway No. 395 that connects Los Angeles with Reno, Nev. The area also produces considerable pumice.

Evaluate Materials for Mineral Wool

LABORATORY testing methods used in evaluating the physical properties of a mineral wool are described in a Bureau of Mines publication, released as a part of an investigation of domestic sources of raw materials suitable for the production of mineral wool to supply increased demands of the building trades. Free copies of the publication "Report of Investigations 4296—Laboratory Methods for Evaluating Materials for Mineral-Wool Production" may be obtained from the Bureau Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Penn.

Buys Limestone Quarry

NORMAN HAMM has announced purchase of the Wheeler Limestone Quarry near Perry, Kan.

Two portable plants have been incorporated in the flow of the permanent Centerville, Calif., sand and gravel plant of Pacific Coast Aggregates, Inc., San Francisco, Calif. The permanent plant is out of picture to left. By addition of portable plants and a stacker-belt system, the operation has been made highly flexible. Plant can produce either dry or washed material

Combine Portable With Stationary Equipment

Combination excavating–haulage units deliver up to 18-cu. yd. of sand and gravel to plant of Pacific Coast Aggregates, Inc., Centerville, Calif.

By W. B. LENHART

A NEW PLANT that might be used to illustrate a trend that has evidenced itself in many parts of the country is the new operation of Pacific Coast Aggregates, Inc., Centerville, Calif. This plant combines a portable plant with additional stationary equipment. Arrangement lends itself to a relatively high total output, and at the same time several sizes of both washed and unwashed aggregate are produced. This installation, like others of similar nature, uses the portable unit as the preliminary treatment section which does all the crushing that is necessary. The portable takes off a dry sand and a "road stone" product, sending the balance of the aggregate to the stationary plant where three sizes of washed gravel are produced along with a washed sand. Should Pacific Coast Aggregates, Inc., ever decide to move this plant, it is apparent that it could be done in a very short time, salvaging a high percentage of the plant. Thus where a deposit is relatively small, or scattered over a wide area, or where a producer is setting up for a large, temporary construction job, such as a dam, it might be well to study the features of this operation.

The plant has a capacity of 400 t.p.h. Centerville, a small settlement from which the plant derives its name, is roughly 20 miles south of Oakland and is only a few miles from Niles, Calif., where gravel production has been featured for many years. The land

A 15-cu. yd. bottom-dump wagon spotted over grizzly above first conveyor that transfers pit-run material to plant. These units travel about one mile from pit to hopper

here is flat and very productive from an agricultural standpoint. Overburden usually is a few feet of soil and the gravel is relatively small in size but some crushing is necessary to get it down to the minus 1½-in. size which seems to be the requirement for most of the plant's output. The plant serves the Alameda, Oakland and East Bay areas by truck.

Some 20 miles east is the company's new Eliot plant, now in the last stages of construction. This plant is one of the outstanding plants of America and definitely is *the* outstanding *new* plant that is being built in this country. So with Radum and Pleasanton, both large sand and gravel areas in this general vicinity, the Centerville plant of Pacific Coast Aggregates, Inc., is one of three new plants to go into this district within a year.

Large Capacity Earth Moving Equipment

Another highly interesting development here is the use of large capacity earth-moving equipment for digging and transporting a part of the pit material to the plant. Here as at the Pleasanton plant, the company is trying out "Terra Cobras," rubber-mounted tractor-scraper units. The company has three of these units: two on stripping and one for pit-run gravel transportation. Each unit carries 18 cu. yd. of material and is powered by a Cummins diesel engine. To load these earth movers additional power is supplied by one of two RD-8 Caterpillar tractors used as pushers. Strippings from the deposit now being mined are used to build up a levee on a nearby water course. This type of earth-moving equipment is well known in highway construction work and its adaption here to the rock industry should be followed with interest.

Main screening station that is part of permanent plant. Note 48-in. sand screw, lower right

In addition to the above pit equipment the company has two 15-cu. yd. Euclid bottom-dump trucks that are loaded by a 2-cu. yd. Link-Belt drag line with an Esco bucket on the line. The trucks haul a distance of about one mile and in addition to dumping to the hopper serving the plant, build up a stockpile alongside this section, where the material may later be dozed to the hopper. Each of these trucks has a "V"-shaped arrangement on the underside that is used to level off any material from a previous load so that a long, high storage pile can be built up without too rough a roadbed.

Radial Stockpiling Belts

A third feature of interest in the plant itself is the use of a radial stockpiler that is a part of the portable section. This unit can build up stockpiles on the ground or it can return the materials to an elevated spout for transfer to the scalping screen. The lay-out in the portable section is rather involved and here there are a total of eight belt conveyors, most of them relatively short. Two of the belts serve the scalping screen, two are stackers (including the radial), and the other four, arranged in a rough square, are essentially a part of the portable section of the plant. They are installed in such a manner as to give a high degree of flexibility.

Equipment

The portable equipment was supplied by Diamond Iron Works. In the primary portable section, designated as No. 96-A, there is a 10- x 36-in.

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Belt, left, recovers pit-run material from hopper for transfer to plant conveyor, foreground. Belt, right, returns crusher oversize to plant belt in closed circuit. Vertical chute, center, permits stacker belt to return material to plant flow for further processing

Rubber-mounted, tractor-scraper combination that is used to haul part of the pit material to the plant

Accident Frequency in the Lime Industry

Data collected over seven year period disclose winter months as most hazardous

By WILLIAM T. HARVEY, Jr.*

IT SHOULD certainly be helpful to lime producers to know that within the limits of probability more accidents will occur in a lime plant during some months than during others. Realization of this fact, accident analyses and subsequent action by plant officials might decrease accidents and their unwelcome effects. Correlation of data recorded over a reasonable length of time would be indicative as to periods of greatest and least accident occurrence.

Safety Competition

Since 1942 the National Lime Association has conducted a monthly safety competition in which any lime plant may participate. Each plant notifies the N.L.A. as to the number of man-hours worked during the month and the number and severity of accidents experienced. Severity and frequency rates are calculated; and a report, listing each plant's standing by severity rate, is sent to all participants. From these reports several plants were selected for study, which had declared their accident experience on a monthly schedule since January, 1942. The 22 plants selected were representative of the lime industry: five were in Pennsylvania; three each in Ohio and Illinois; two each in Texas, Missouri, and West Virginia; and one each in Wisconsin, Virginia, Tennessee, Washington, and Massachusetts. Annual man-hours worked varied from 20,000 to 700,000. Plant types include those with quarries and with mines and those without either.

Using the monthly reports from these plants, a monthly frequency rate was calculated for the group as the "number of accidents occurring per million man-hours worked." When these frequency rates were plotted chronologically the resulting graph appeared, as in Fig. I. The broken lines indicate yearly averages and it can be seen that the general trend is downward. Subsequent data will indicate whether this trend is definite or whether it is at variance with a long-time average. If the former is true and the trend is to lower frequency rates, it represents an increase in safety vigilance.

Another interpretation of Fig. I may be obtained by averaging similar months of the seven years reported. A plotting of monthly average frequency rates versus months in the year appears in Fig. II. The broken line indicates the frequency rate average for the years 1942-1948 and was found to be 25.77 accidents per million man-hours. Seven months—January, February, March, April, July, November, and December—had frequency rates above the overall average with the month of March having the highest value. On the other hand, September shows a decrease in frequency of 21 percent below the average. Generally, it seems that the *bad weather* months, or those having extremes in cold, wet, and heat, are periods of greatest accident experience.

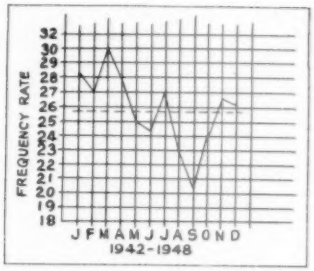

Fig. 2: Monthly average accident frequency rate variation, 1942 to 1948

Hazards in Industry

A study of lime producing conditions reveals that a lime plant is essentially an "open air" heavy industry operation. This means that weather is an important factor, introducing the hazards of rock falls and slides through freezing and thawing, unsafe footing, and constant exposure, to name a few. A lime plant requires the use of explosives, heavy machinery and the moving of large loads.

It is interesting to note, however,

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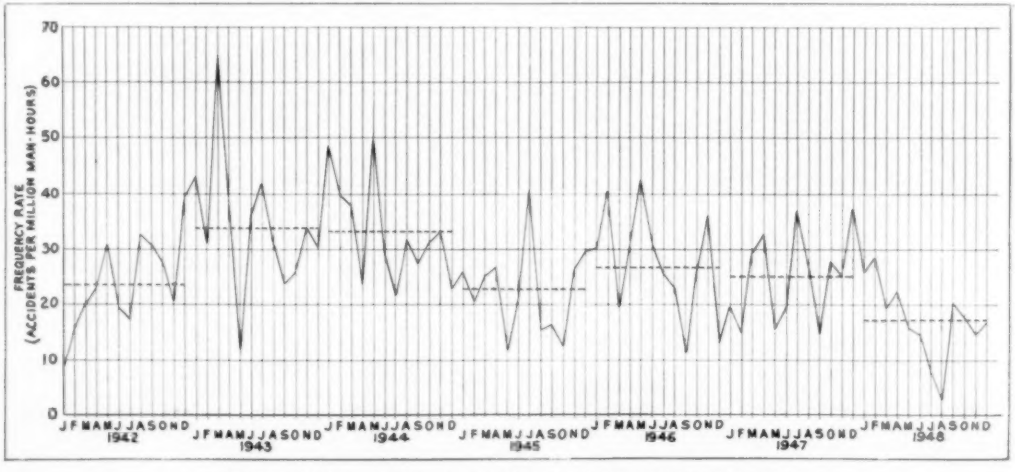


Fig. 1: Accident frequency rate variation for 22 selected lime plants, 1942 to 1948

*Formerly Chemical Engineer, National Lime Association

Durability

(Continued from page 79)

not make as permanent concrete as the old apparently entered no one's mind, because all concrete was then considered permanent.

Incidentally the only purpose of lime in an hydraulic cement seems to be to activate, or render soluble or colloidal some of the silica and alumina it is associated with. That it remains in the hardened concrete appears to be more incidental than necessary, for the actual cement is, or at least has all the properties of a silica gel. The more of the gel in proportion to the lime in the end product, apparently the better the cement, because the lime remains a soluble ingredient regardless of what its combination with the silica or alumina may be. In other words, by using lime in association with reactive silica man has been able to accomplish in a matter of hours, days or weeks what took Nature a matter of hundreds, or possibly thousands of years to accomplish in the production of silica gel in places where it is needed. In that respect only man has improved upon Nature in the making of concrete.

We didn't get very far toward considering the permanency of concrete until fairly recently, when it became all too evident that much concrete is not permanent. Yet no one seems particularly interested in trying to find out why at least some of the concrete made with the old cements is good. Our own theory is that it was chiefly because the old cements had a better balance between basic and acid compounds in the hydrated cement. It is difficult to prove this because no one really knows what the end products of hydrated portland cement are.

If the calcium silicates in hydrated cements resemble the sodium silicates, the real nature of hydrated cement is a silica gel, to which ions (that is electrically charged atoms or molecules, or groups of atoms and molecules) of calcium are attached by opposite electrical charges. All the sodium or calcium ions may not be on the surfaces of the silica gel, because the gel is porous and filled with capillary channels. Some of the ions may be adsorbed in these, and consequently are more difficult to remove. The silica gel nucleus is negatively charged and the sodium, potassium and calcium ions positively charged. There appears to be no actual chemical combination, for practically all the calcium can be removed from pulverized, hardened cement by simply filtering water through it. The gel will hold on to the last few ions of calcium more firmly than the surplus ones, and therefore the mono calcium or meta silicate is the most stable.

L. S. Brown and R. W. Carlson in their paper "Petrographic Studies of Hydrated Cements," A.S.T.M. Proceedings, 1939, make it clear that the most important end product of hardened hydrated cement is in all probability plain silica gel, and that this is the only real cementing agent. If true, the objective in making a permanent concrete is to have all the voids in the aggregate filled with silica gel, and to keep them filled with the gel, as it loses its water and shrinks. This would be an argument for using a slowly hydrating cement rather than one that hydrates rapidly—in other words a more coarsely ground and a lower limed cement. Under suitable conditions, the silica gel will eventually attain a condition similar to or identical with chert. After a long time, under pressure, in the interior of massive concrete, it could, according to what is known about silica, become quartz. An interesting part of this theory is the fact that heat greatly helps these reactions. In sand-lime brick manufacture, where the mixture of 8 or 9 percent lime and 92 or 91 percent silica sand is compressed and treated to high steam pressure in an autoclave, this reaction takes place in a few hours without volume change. Therefore, if there is reactive silica or a puzzolan in the concrete of massive dams, instead of cooling the concrete by expensive methods, it would seem more logical to encourage a maximum of heat from the hydrating cement. One of the tricks the Romans used was to mix the puzzolan with the lime before hydration so as to get the benefit of the heat in its reaction with the silica.

As to the effect of alkalies in portland cements, some of the mysteries can be more intelligently attacked as we learn more about the phenomena of base exchange in soil chemistry. A recent book on this subject is Walter P. Kelley's "Cation Exchange in Soils," published in December, 1948. Soil particles consisting of silica and silicate or clay particles have the power to attract and hold on their surfaces ions of the various base or alkaline elements, and such other basic substances as ammonia. This base exchange is similar to the chemistry of the alkali silicates. In the presence of moisture and suitable conditions calcium ions will replace sodium, and so on one base will replace another through the whole scale of soil elements. One reason for adding lime or limestone to the soil is to promote this base, or cation, exchange—or in other words to create *instability* in the soil so that it will yield up its food plant substances. That strengthens a previous theory that an excess of calcium hydroxide, or hydrated lime, in hydrated portland cement must also be an unstabilizing factor, since the concrete contains the same minerals found in soils. It is another argument for adding reactive silica or some other acid salt to cut down the base exchange activity and stabilize the concrete.

An explanation of the alkali reactive aggregate mystery may also be found in soil chemistry. In soils high in sodium concentration, the so-called alkali soils, adding lime does not help by releasing the sodium to solution. These soils must first be treated with an acid salt like gypsum to reduce their sodium alkalinity. From this analogy it can be reasoned that sodium concentration on or around a particle of aggregate keeps the calcium hydroxide from functioning normally, in which case calcium ions would replace the sodium and be deposited on or in the silica or silicate gel. Since calcium is much less soluble or less easy to remove than the sodium, this exchange would be progress toward a stabilized concrete. It is evident that the object of soil chemistry is to create *instability* in soils, for a stable soil would be an inert or infertile one. Most such soils are on the acid side. On the other hand the object of concrete chemistry is to create *stability*, yet concrete is far more basic than most soils. There again you have an argument for adding an active silica or silicate to concrete mixtures because these reduce the alkalinity of the mixture.

Aggregates

Not much has been said about aggregates as such, and I fail to see in a new approach to concrete research why so much stress need be placed on the qualities of aggregates except as they are a part of concrete. We must acknowledge that no aggregate is inert, and instead of searching for one that is, we should direct attention to how they react with cement and mortar, and how those reactions can be made beneficial. Then, we can take full advantage of any latent activity to produce good, permanent concrete. It is conceivable, to me at least, that a concrete made entirely of chert aggregates, both fine and coarse, with a sufficiency of minus No. 100 and No. 200 mesh particles, might make an ideal concrete, because it would consist of material closely allied to the cement gel, and if my deductions are correct, the concrete would have little or no thermal expansion. It might even be desirable to use a high alkali cement with such aggregates to get maximum reactivity.

In regard to the bad effects of high alkali cements and reactive aggregates, it is believed that a better understanding of alkali silicate chemistry will provide a relatively simple explanation. For example, if a portland cement contains 1.0 percent of sodium and potassium oxides, a bag of cement contains almost 1 lb.—no inconsiderable amount. The alkali oxides hydrate and hydrolyze almost immediately when water is added to the mix, and the alkali hydroxides are formed. These are much more effective agents for dissolving silica, or putting it in colloidal or reactive form, than is calcium hydroxide or lime. Hence, even relatively coarse particles of aggregate containing silica other than

quartz, are soon attacked by the alkali hydroxides, with the formation of an alkali silicate.

An alkali silicate solution will adsorb 4.4 times as much silica as it contains sodium oxide. As the content of silica increases in proportion to the sodium oxide, the liquid becomes more and more viscous. At some stage then the silicious aggregate and its attacking alkali hydroxide become enclosed in a film or membrane of viscous alkali silicate, which serves to screen out the minerals in colloidal solution in the outside water, but will allow the water itself or an electrolyte such as alkali hydroxides to pass through, by the chemical process known as dialysis. The solution of alkali oxides, the hydroxides, have great affinity for water, which means they will draw water from the outside through the silicate membrane. Were the enclosing membrane free to expand, like a balloon, it would constantly grow in size, but it is confined by the walls of the cavity that the solution of the aggregate particle has made in the mortar or concrete matrix. The result is that hydraulic pressure is built up by the water trying to get inside the envelope, or membrane, and this is the osmotic pressure that the Bureau of Reclamation engineers and chemists talk about. This pressure sometimes becomes great enough to crack and disrupt a considerable thickness of concrete.

This explanation corresponds with the description of these pockets of aggregate reactivity. They are found to be surrounded by a viscous liquid (the alkali silicate membrane) and this liquid analyzed chemically is said to consist of a miscellaneous collection of mineral elements, just as would be expected, since these minerals are dialyzed out by the membrane, and we would find ions of sodium, calcium, iron, alumina, etc., attached to its exterior surface. The sodium and potassium on the inside walls of the film still would be available for constantly renewing the strength of the alkali hydroxide, so that the dissolution process goes on indefinitely.

We can reason from this, that since the alkali hydroxides are so much more effective in activating silica, than calcium hydroxide, a little of them well distributed in a portland cement which also has active silica equally well distributed as an interground puzzolan, might make the ideal cementing material. The only objection to a reactive piece of aggregate is that it concentrates a reaction, which would otherwise be helpful. If the alkali silicate membrane is kept sufficiently dilute, that is not viscous, it probably does not dialyze the surrounding solutions, and that is the explanation of why a limit of say 0.6 percent combined alkali oxides in portland cements is effective in slowing or preventing destructive expansion. But there obviously must be other ways of preventing concentrations of viscous alkali silicates, and may be merely providing enough active silica for the alkali hydroxides to work on is one, since researchers tell us that beyond a certain percentage of reactive aggregate, they sometimes do not get bad results.

Conclusion

These theories are suggested chiefly to call attention to the advisability of straying into the literature of other sciences rather than relying solely on the current literature on cement and concrete research. Those interested in research on cement, concrete and aggregates should not neglect books, or A.S.T.M. or A.C.I. papers because they are old. They are never out of date because even 50 or 100 years ago men of science were just as earnest in gathering data and making experiments as they are today Their data and theories can throw light on present problems.

Slag

(Continued from page 66)

Hamilton plant of the American Materials Corp. is made easily available a plant food that can well be studied by all who are interested in the production or use of agricultural liming materials.

The home office of the American Materials Corp. is at Greenville, Ohio. F. D. Coppock is president; Guy C. Baker and George A. Frenoe, vice-presidents; W. E. Hole, secretary and treasurer and J. C. Patty, chief engineer. George D. Schueneman is manager, Walter B. Evans, superintendent of operations, S. B. McCabe, slag plant superintendent, Walter Ray, assistant slag plant superintendent, and Paul Corbett, office manager.

Safety

(Continued from page 94)

that the somewhat related portland cement industry has fewer injuries during January, February, March, and December than during the remainder of the year; and, in the summer time, has the greatest number of accidents. Also, in 1947, 134 cement plants had an average frequency rate of 7.23; during the same year, 40 lime plants had an average frequency rate of 32.66. Further examination of the records reveals that 22 percent of the reporting cement plants experienced no accidents, while 10 percent of the reporting lime plants were accident free.

Safety Contests Help

Other interesting comparisons may be drawn within the lime industry between those plants which have active and continued safety support and those which do not. As previously stated, the 22 plants on which this report is based have participated in the N.L.A. monthly competition since its start. In other words, they have shown the most interest for the longest time. If this group is compared with the larger group (reporting annually) of which it is a part, the following data are revealed: in 1945, for instance, the large group (42 plants) had an annual frequency rate average of 30.23 and the small group (22 selected plants) had an average of 22.50. In 1946, the large group (36 plants) averaged 34.20, and the small group averaged 26.45. In 1947, the average frequency rate for 40 plants was 32.66, while for the small group it was 24.79. These data prove that plants with more thorough interest and activity in safety are the plants which obtain better safety records.

As indicated by Fig. I, the lime industry is lowering its accident frequency rate. When safety data are compared with those from similar industries, it is realized that the lime industry still has a long way to go. Perhaps this brief analysis may aid some plants to prepare for some of the "natural" hazards and thereby reduce their accidents.

Portability

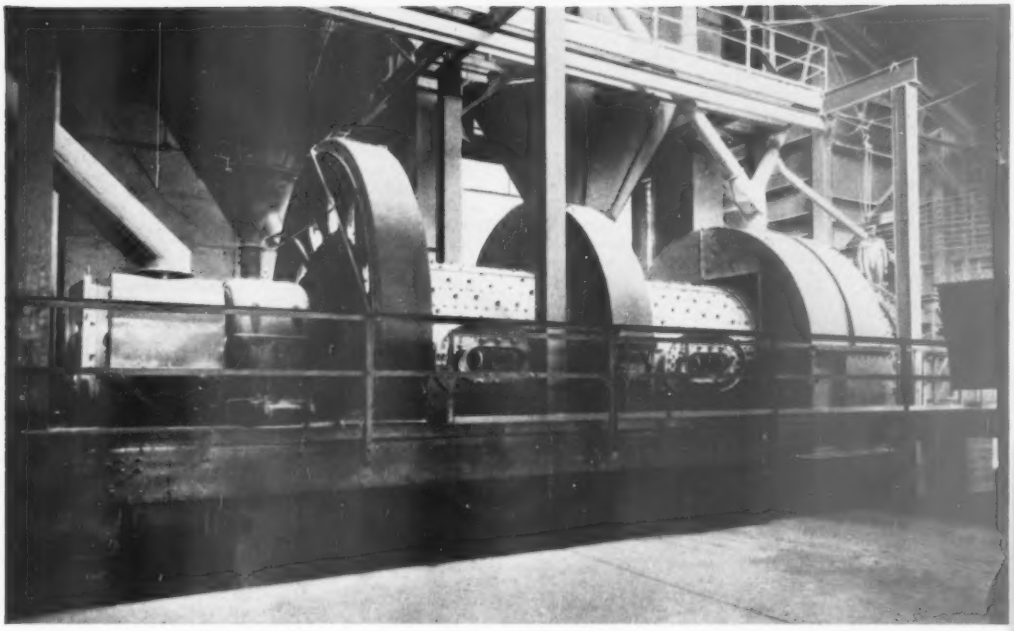
(Continued from page 93)

jaw crusher and a 4- x 10-ft. single-deck scalper operated without addition of water. The other section of the portable plant is a No. 96-B and features a 40- x 22-in. set of rolls and a 1½-decked, 4- x 10-ft. sizing screen for dry sizing. Material stockpiled by the radial belt is recovered by a Haiss loader.

The material through the scalper (minus 1½-in.) falls to an inclined belt and is elevated to the permanent plant which has a 4- x 12-ft. wet, three-deck washing screen. The gravel sizes drop to small bins from which individual stacker belts are fed. These belt conveyors are all driven by U. S. Electrical Motors, Inc., Syncrogear motors, and operate unprotected from the weather on the high end of the stackers. Fines from the lower deck flow to a 48-in., Wemco sand machine that is producing 90 t.p.h. of sand containing around 12 percent moisture. Top size here is minus ¼ in. The unit is handling around 750 g.p.m. of water. An Allis-Chalmers vibrating screen is available for sizing out pea gravel. Tailings from the washing plant flow to a sump from which they are pumped to waste by a 6-in. Krogh pump. Water for the plant is supplied by a Western deep well pump that is powered by a directly connected Type CFU, 150-hp., U. S. motor. The pump operates at 1800 r.p.m.

The sand and washed gravel from the four stacker belts are reclaimed to

(Continued on page 98)



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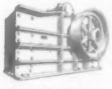

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Portability

(Continued from page 96)

six, hopper-bottomed, cylindrical steel bins that roughly form a semi-circle about the plant. These are filled by a Northwest clam-shell rig. There are no rail shipments from this plant. Trucks load from these semi-portable bins that were originally fabricated for the old Niles plant by the Western Pipe and Steel Co. All the belts in the plant are 24 and 30 in. and were supplied by American Rubber Co.

At Centerville, the company has a batching plant that features a Blaw-Knox electronic-controlled cement weigh batcher. This piece of equipment was formerly sold by the Conveyor Co. of Los Angeles, but Blaw-Knox has taken over the manufacture and marketing of this accurate cement and aggregate weighing device. The batching plant uses a Neptune water meter and Kron dial scales.

J. D. Kaufman is operating manager for Pacific Coast Aggregates, Inc. Leo Bunds is assistant operating manager, and Q. Collinson, superintendent. At time of inspection Bill Bottini from the Pleasanton plant was acting as superintendent.

Labor Relations

(Continued from page 47)

ing a routine examination of the company's locomotives recommended that they be turned end for end, because of the wear on the wheel flanges. This put the locomotive driver (or engineman) on the right side of the cab instead of the left side. The interested employes claimed this change resulted in a "serious hazard to life and limb," and without waiting for the regular grievance procedures, called a strike, which of course was a violation of their contract. The ringleaders then proceeded to call out the employes of the other plants of the company. The company fired them "for just cause," along with a third employe who was one of the train conductors.

The arbitrator ruled that the first two, as members of the grievance committee, owed a duty to the union and to the company to be especially careful to follow procedures set forth in the contract for the handling of grievances. Therefore, their discharge was justified and they stayed fired. The third man, the conductor, in spite of active leadership in the strike, was held to be justified in his belief that the reversing of the locomotive cab was a personal hazard to him, and in view of his long service with the company, the arbitrator ruled, should be offered reëmployment, without back pay, but with such seniority as he would now have, had his discharge originally been a layoff.

After conference with the men, the company agreed, in a day or two, to turn the locomotives around, so that the position of the driver's seat would not be reversed, and the strike ended; all but the three mentioned being returned to their jobs.

Salesmen's School

(Continued from page 78)

future, help him get his foot in the door and land that order for a million tons of crushed stone.

The last day of the sessions was devoted to demonstrations in the laboratory of the crushed stone association in Washington, D. C. Here the students were divided into two groups for convenience of handling in the laboratory. Mr. Goldbeck and Field Engineer J. E. Gray, plus the laboratory staff, showed the students the methods and equipment used for testing crushed stone, concrete, bituminous concrete, and similar materials, so that, in the future, when they read, or talk of the many tests, their talks will have a background of actual experience with such tests as a basis.

We think the speakers did a fine job and I know, speaking for myself, that I learned a lot and am glad to include myself as as alumnus of the N.C.S.A. short course in salesmanship. The following speakers participated in the school:

John Biggs, Engineer, National Crushed Stone Association
Carl A. Carpenter, Senior Materials Engr., Public Roads Administration
Paul Critz, Senior Civil Engr., Public Roads Administration
George H. Dent, District Engr., Asphalt Institute
James W. Feild, Sanitary Engr., Engineering Div., Office of Chief Engrs.
A. T. Goldbeck, Engineering Director, National Crushed Stone Assn.
J. E. Gray, Field Engr., National Crushed Stone Assn.
Herbert Insley, Chief, Min. Prod. Div., Nat'l Bur. of Standards
George E. Martin, Consulting Engr., The Barrett Div., Allied Chem. & Dye Corp.
E. V. Scott, Ass't Gen. Manager, Southwest Stone Co., Dallas, Texas
Fred E. Swineford, Engr. Director, Macadam Pavements, Inc.
D. O. Woolf, Senior Materials Engr., Public Roads Administration

Necessary Booklets

(Continued from page 62)

Necessary Booklets on Aggregates

Aggregates for Portland-Cement Concrete; (4) Aggregates for Bituminous Construction; (5) Aggregates for Miscellaneous Use; and (6) Needed Research.

The papers included in this symposium are as follows:

Introduction to Symposium—K. B. Woods, symposium chairman.

Distribution of Mineral Aggregates—K. B. Woods, professor of highway engineering, and associate director, Joint Highway Research Project, Purdue University, Lafayette, Ind.

Petrographic and Mineralogic Characteristics of Aggregates — Roger Rhoades and Richard C. Mielenz, chief geologist and head, Petrographic Laboratory, respectively, Bureau of Reclamation, Denver, Colo.

Physical and Chemical Tests of Mineral Aggregates and Their Significance—Harold S. Sweet, research engineer, Purdue University, Engineering Experiment Station, Lafayette, Ind.

Sampling of Mineral Aggregates—C. E. Proudley, chief materials and test engineer, North Carolina State Highway and Public Works Commission, Raleigh, N. C.

Production and Manufacture of Fine and Coarse Aggregates—Nathan C. Rockwood, editorial consultant, ROCK PRODUCTS, Chicago, Ill.

The Grading of Aggregates for Bituminous Construction—Jewell R. Benson, bituminous engineer, U. S. Bureau of Reclamation, Denver, Colo.

Grading of Mineral Aggregates for Portland-Cement Concrete and Mortars—Walter H. Price, materials engineer, Bureau of Reclamation, Denver, Colo.

Influence of Mineral Aggregates on the Strentgh and Durability of Concrete—Charles W. Allen, research engineer, Ohio Highway Department, Columbus, Ohio.

Lightweight Aggregates—Raymond E. Davis and J. W. Kelly, professor of civil enginering and associate professor of civil engineering, respectively, University of California, Berkeley, Calif.

Mineral Aggregates for Bituminous Construction—J. T. Pauls and C. A. Carpenter, principal highway engineer and civil engineer, respectively, Public Roads Administration, Washington, D. C.

Mineral Aggregates for Low-Cost Roads and Water-Bound Macadams—Edward A. Willis and James A. Kelley, Jr., senior highway engineer and associate highway engineer, respectively, U. S. Public Roads Administration, Washington, D. C.

Mineral Aggregates for Railroad Ballast—A. T. Goldbeck, engineering director, National Crushed Stone Association, Washington, D. C.

Mineral Aggregates in the Chemical and Processing Industries and in Certain Other Uses—Herbert F. Kriege, technical director, The France Stone Co., Perrysburg, Ohio.

Needed Research—D. O. Woolf, senior materials engineer, Division of Physical Research, Public Roads Administration, Washington, D. C.

Use of Fluorspar in Steelmaking

DEMAND FOR FLUORSPAR was greatly increased by the introduction of the basic open hearth system. In 1900, the steel industry was consuming more than 10,000 tons per year of this mineral; but by 1947, more than 204,390 tons were required by the industry. When medieval iron and steel makers used limestone in their furnaces, they probably also unknowingly used fluorspar as a fluxing agent, since the two are commonly found in association with each other. Early in the Italian Renaissance, Georgius Agricola wrote of the pure mineral as a usable agent.

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INDIANA LIMESTONE CO. has started testing 6500 acres of land in Lawrence and Monroe counties, Ind., for limestone.

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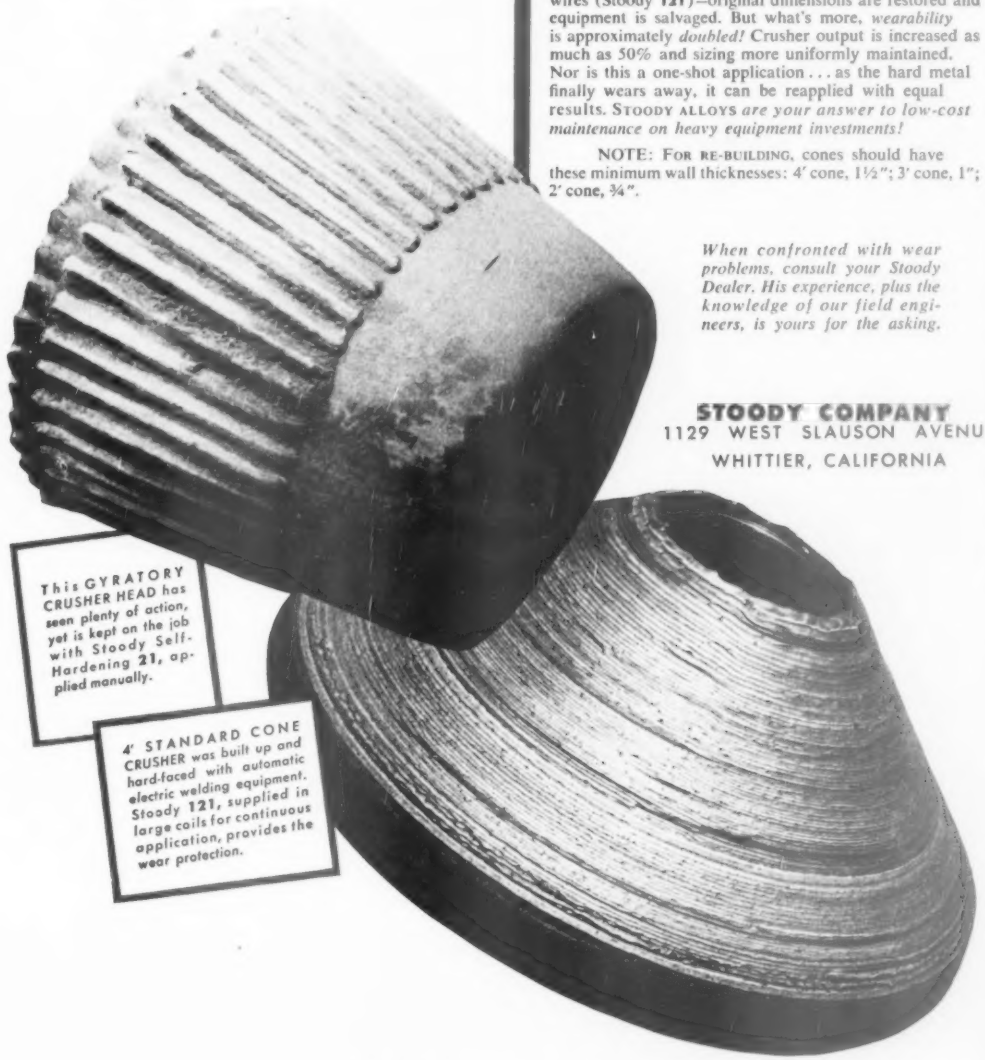

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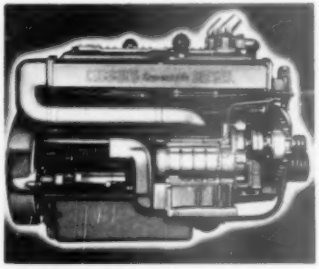
A.I.M.E. — Cement

(Continued from page 85)

The ten plants in Oregon, Washington and Idaho have a combined capacity of 7,500,000 bbl. annually and the apparent need is for 8,000,000 bbl. by 1950. Assuming that production cannot be maintained at an average in excess of 75 percent of capacity, according to the author, a capacity of 11,000,000 bbl. is indicated as required.

It was pointed out that costs are a deterrent to new plant construction, the figure now being more than six dollars per bbl. of annual capacity as compared to two dollars in years past.

Civilian requirements now exceed present production and, it was pointed out, demand for cement for large government projects has just started to complicate the supply picture by an estimated need for two million additional bbl. per year. The average per capita consumption of cement for the nation is now close to 1.5 bbl., which is an all-time high, and about 1.3 for the Pacific Northwest exclusive of requirements for federal projects.



Manifold side of 550-hp. diesel, a V-type 12-cylinder engine

Diesel with 550-hp. Capacity Rating

CUMMINS ENGINE CO., INC., Columbus, Ind., while playing host at its plant to editors and writers from a number of newspapers, press associations, business journals and trade papers, unveiled its new Model NVHS-1200 diesel engine, said to be the most powerful high speed diesel in production. The unit, a 4-cycle, 12-cylinder, V-type, supercharged diesel, has a maximum rating of 550 hp. turning at 2100 r.p.m. Also announced was a companion Model NVH-1200, a 4-cycle, 12 cylinder, V-type diesel having a maximum rating of 400 hp. turning at 2100 r.p.m. The units are said to have expanded the horsepower range of single unit Cummins Dependable Diesels from former limits of 58-275-hp. (maximum) to the current line of 58- to 550-hp. (maximum). Other features of both units listed by the manufacturer are fuel economy, reduced overall engine dimensions, redesigned fuel pumps and a double disc arrangement whereby one disc allows fuel to pass into the metering pump, while the other performs distributing function only.

Manufacturers' News

Lear, Inc., Grand Rapids, Mich., has announced the election of three new directors, namely, Harold R. Boyer, director of production engineering for General Motors Corp.; Thomas M. Belshe, company representative at Washington, D. C.; and O. C. Hall, president of Northern Air Service, Inc., in addition to Frederick D. Gearhart, Jr., and William P. Lear.

W. A. Jones Foundry & Machine Co., Chicago, Ill., announces the appointment of Joseph A. Marland as sales manager; Thomas A. Jones as assistant sales manager; and Joseph A. Guyer as advertising manager.

Pettibone Mulliken Corp., Chicago, Ill., announces the appointment of Paul E. Lundquist as sales manager of the construction equipment division. He will assist E. J. Seifert, president, on matters relating to sales policies, advertising and expansion of its line of construction equipment.

Whiting Corp., Harvey, Ill., has announced the appointment of the Minnesota Supply Co., Minneapolis, Minn., as distributor for foundry equipment, to succeed the E. R. Frost Co. of Minneapolis, in North Dakota, South Dakota, Minnesota, and parts of Iowa and Wisconsin.

The Dow Chemical Co., Midland, Mich., has appointed William S. Loose as magnesium division sales manager. He was formerly director of the laboratory development section. The product development and technical service departments have been combined into a single department designated as technical service and development with Dr. George H. Found as manager. Mr. Loose will be in charge of this department in addition to all magnesium selling activities.

Hyster Co., Portland, Ore., has appointed the Machinery & Supplies Co., Inc., Kansas City, Mo., as distributor of lift trucks, straddle trucks and mobile cranes in 60 counties of western Missouri, 31 counties of northern Oklahoma, and all of Kansas, under the direction of George W. Gagel, president and general sales manager.

Phenoplast Corp., New York, N. Y., manufacturers of a cold setting phenolic plastic coating called Phenoplast, has announced the appointment of L. Sonneborn Sons, Inc., as national distributor.

American Hoist & Derrick Co., St. Paul, Minn., announces the election of Stanley M. Hunter as executive vice-president. He joined the sales department in 1936, and has served as vice-president of sales and a member of the board of directors since 1945.

Chain Belt Co., Milwaukee, Wis., has announced the appointment of William A. Clayton as Eastern sales representative for the construction machinery division, with headquarters in New York City.

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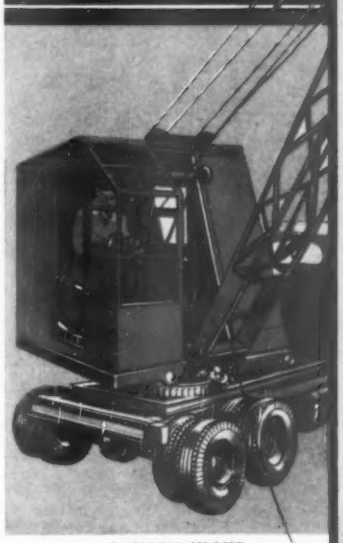

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1 Convertible Units
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The essentials built into every "QUICK-WAY" mean sure profits on a small investment; economical to buy, economical to use, it's one of the most useful machines you can own. There's a "QUICK-WAY" owner near you; ask HIM. Your nearby "QUICK-WAY" distributor has a pleasant surprise for you when you ask him for prices.

MODEL E: 4/10 cu. yd. cap.
mounts on any standard 5-ton truck.
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The Dow Chemical Co., Midland, Mich., announces that Earl W. Bennett, treasurer since 1930, has been elected chairman of the board. Leland I. Doan, vice-president since 1938 and secretary since 1941, has been made president of the company, and Dr Mark E. Putnam, a vice-president since 1942, has been named general manager. These appointments were made as a result of the death, March 31, of Dr. Willard H. Dow, who formerly held all three of these positions. Dr. A. P. Beutel, general manager of the Texas Division, and Russell L. Curtis, general manager of the Great Western Division, were named vice-presidents. Carl A. Gerstacker succeeds Mr. Bennett as treasurer, and Calvin A. Campbell, legal counsel for the firm, assumes Mr. Doan's duties as secretary.

Earl W. Bennett

Leland I. Doan

Mr. Bennett retains his vice-presidency and also his position of chairman of the finance committee. He began his career with the company in 1900 as bookkeeper. Two years later he became auditor and in 1905 assistant secretary and assistant treasurer. He has been a member of the board since 1927.

Dr. Mark E. Putnam

Mr. Doan joined the sales department of the industrial chemicals division in 1918. He was made assistant sales manager in 1922, general sales manager in 1929, and director of sales in 1945. He has been a member of the board since 1935.

Dr. Putnam joined the company in 1915 as a research chemist and was soon made production manager. He became a director in 1941 and a vice-president a year later. He has also been president of Cliffs Dow Chemical Co. since 1939.

Dr. Beutel started with the company in 1914 as an engineering draftsman. He subsequently became assistant to the president and assistant general manager. He supervised construction of the Texas division and became general manager. He has been assistant secretary since 1941, a member of the board since 1948, and president of Dowell, Inc., since 1939.

Mr. Curtis has been with the company since 1922 when he started in the insecticide sales division. He was made assistant sales manager in 1931, and in 1938 moved to San Francisco as executive manager of the West Coast project. A few months later he became general manager of the Great Western Division and in 1941 became an assistant secretary. He was made a member of the board in 1948.

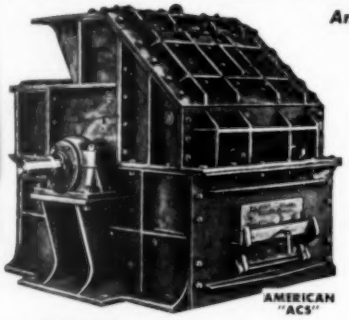
Mr. Gerstacker started in the auditing and accounting department of Dowell, Inc., in 1938. Returning from service in the army, he was made assistant director of purchases and was appointed assistant treasurer in March of this year. He was made a director in 1948.

Mr. Campbell entered the company as head of the legal department in 1935. He has been a director since June 1, 1948.

Chase Bag Co., Chicago, Ill., has announced the transfer of R. H. Ayers from the Detroit sales office to the position of sales manager of the Toledo branch covering the State of Ohio and parts of Michigan, Indiana and West Virginia. J. F. Kressler, former sales representative in Cincinnati, has been transferred to Detroit where he will direct operations of that office.

International Harvester Co., Chicago, Ill., has announced the appointment of Peter A. Becker as general superin-

WHAT'S THE SIZE OF YOUR CRUSHING JOB?



AMERICAN "ACS"

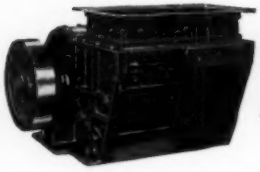
Americans offer the action and the capacity you need.

For heavy-duty reduction of one-man size to roadstone or agstone the American "ACS" Hammermill offers 3 sizes — up to 250 TPH.

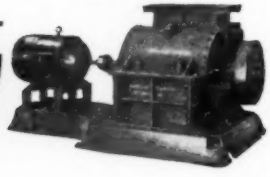
Center feed models produce a higher ratio of fines through longer travel of stone in hammer cycle. Front feed models minimize fines.

"Brute"
"Broadhead"
"Splitter"

American "30" Sizes up to 100 TPH



American "24" Sizes up to 50 TPH



Send for "Better Stone Crushing" Booklet

American PULVERIZER COMPANY
Originators and Manufacturers of Ring Crushers and Pulverizers
1245 MACKLIND AVE.
ST. LOUIS 10, MO.

tendent of the Melrose Park works, replacing Brooks McCormick who has been transferred to Kansas City, Mo., as district manager of the general line and industrial district office. W. H. Kuhlman has been appointed general supervisor of advertising and sales promotion, succeeding Donald Jones, and J. R. Roberts has been named supervisor of sales promotion to replace Mr. Kuhlman.

United States Rubber Co., New York, N. Y., announces that Walter F. Spoerl, formerly general sales manager of the mechanical goods division, has been named general sales manager for all divisions, under the supervision of Ernest G. Brown, vice-president and general manager. Robert D. Gartrell, development manager for the Passaic, N. J., plant, has been appointed development manager for all divisions, and Wesley A. Armstrong, factory manager of the Bristol, R. I., plant, has been made production manager. James E. Power has been appointed manager of national accounts sales for the mechanical goods division with W. A. Tipton as manager of branch sales and O. S. True as district sales manager for the New York branch of the division. Frederick S. Bartlett succeeds Mr. Armstrong as factory manager of the Bristol, R. I., plant.

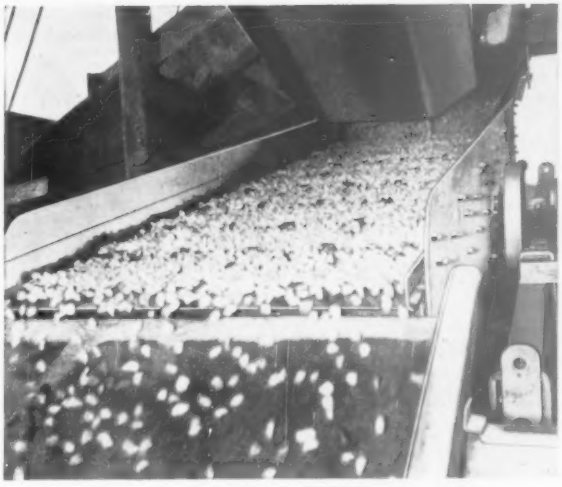
Gar Wood Industries, Inc., Wayne, Mich., announces the appointment of the Mike and Joe Equipment Co., Rochester, N. Y., as distributor in the western section of the State of New York, and the Peerless Mfg. Corp., Ft. Wayne, Ind., as distributor for the northeastern section of Indiana.

Mineral Pigments Corp., Muirkirk, Md., has opened a New England sales office under the direction of M. J. Fenton, with headquarters in Boston, Mass. A sales office has also been established in the Minneapolis-St. Paul area, under the direction of E. Bushnell, covering Minnesota, North and South Dakota. Murray Kornbluth will be in charge of production of chrome colors, iron blues, etc., and Thomas Morris, formerly in the Toronto, Canada, office, will have charge of production of synthetic yellow, red, brown and black iron oxide.

Detroit Diesel Engine Division, General Motors Corp., Detroit, Mich., announces that Raymond E. Danto has joined the sales staff as a market analyst. Announcement has also been made of the training program for retail sales personnel at a series of two week conferences recently held in Detroit.

The B. F. Goodrich Co., Akron, Ohio, has announced the appointment of Charles L. Campbell as sales development manager of the Eastern division, which comprises the New York, Albany and Buffalo, N. Y., Boston, Mass., and Pittsburgh and Philadelphia, Penn., districts. L. O. Veith, formerly manager of the Harrisburg, Penn., retail store, will succeed Mr.

Here's Accurate Sizing at 3½ Tons a Minute



This SECO vibrating screen now in 11th year of service for B. V. Hedrick Gravel and Sand Co., Lilesville, N. C.

Here's another example of how Seco vibrating screens are making screening more profitable for operators. The positively controlled, true circular action of a Seco is your assurance of accurate sizing, high tonnages and low maintenance.

The Seco pictured here is mounted high up in the air, yet it operates so smoothly that no vibration is transmitted to the supporting framework. No matter what screening you have to do—coarse gravel, stone, sand or ag-lime, a Seco will do efficiently and economically and will serve you faithfully for many years.

Send your screening requirements to Seco or write Dept. M for New Catalog No. 203.

SECO VIBRATING SCREENS

SCREEN EQUIPMENT CO., INC.
BUFFALO 21, NEW YORK
In Canada, United Steel Corp. Ltd., Toronto, Ont.

There's a Macwhyte Rope that's the right rope for your equipment

All job proved - - a thousand and one wire ropes to choose from

For easy handling and longer service use PREformed Whyte Strand Wire Rope—it's internally lubricated

Ask a Macwhyte representative to recommend the rope best suited for your equipment.

Manufacturers of Internally Lubricated Wire Rope, Braided Wire Rope Slings, Aircraft Cables and Assemblies. *Catalog on request*

MACWHYTE COMPANY

2949 Fourteenth Avenue, Kenosha, Wis.

Mill depots • New York • Fort Worth • Pittsburgh • Portland • Chicago • Seattle • Minneapolis • San Francisco • Los Angeles

Our distributors and mill depots throughout the U. S. A. and other countries carry stocks for immediate delivery.

Sauerman Scraper rigged with carrier for high speed gravity return operation.

Sauerman Slackline Cableway moves gravel from pit direct to screens.

INCREASE YOUR PROFITS by moving materials the SAUERMAN Way

Lower costs are the rule when Sauerman Scrapers and Slackline Cableways are used in sand and gravel excavation, stockpiling and other material-handling jobs where the long reach of these machines can be employed to advantage.

Digging, hauling and automatic dumping of any bulk material become one continuous operation, entirely controlled by one operator. First cost is low, upkeep is simple.

Wide range of handling capacities and operating spans.

Let Sauerman engineers study your digging or stockpiling problems. Their advice may save you money and will be given free. Write for catalog.

SAUERMAN BROS., INC.

530 S. Clinton St., Chicago 7, Illinois

Campbell as manager of the Philadelphia district of the replacement tire sales division.

Goodyear Tire & Rubber Co., Akron, Ohio, announces that Frank W. Fox has retired from the truck and tractor tire division after 35 years of active service with the company.

Union Pacific Railroad Co., New York, N. Y., has announced the election of Ambrose J. Seitz as executive vice-president. William T. Burns, general freight traffic manager, will succeed Mr. Seitz as vice-president of traffic, and James R. MacAnally, assistant freight traffic manager, will assume Mr. Burns' position as general freight traffic manager. Norman B. Marvin, assistant to the traffic vice-president, has been promoted to assistant freight traffic manager.

Hyster Co., Portland, Ore., announces that Jack A. Cairns, formerly assistant to the western division sales manager, has been transferred to a sales engineering position in the Los Angeles area. William Kilkenny has been appointed district manager of industrial truck sales in the western division, which comprises 11 western states, four western provinces of Canada, also Alaska and Hawaii.

Schield Bantam Co., Inc., Waverly, Iowa, announces that erection of its new plant and offices has been completed.

Wire Reinforcement Institute, Inc., Washington, D. C., announces the appointment of Frank B. Brown as managing director of the Institute, succeeding T. J. Kauer, who has recently accepted appointment as director of the Department of Highways, State of Ohio. For the past ten years Mr. Brown has been in charge of structural concrete design for the Arthur G. McKee Co. of Cleveland.

The Euclid Road Machinery Co., Cleveland, Ohio, has appointed V. L. Snow as domestic sales manager, succeeding the late W. W. Paape who passed away on March 18. J. W. Bloomquist, formerly district representative for the Minnesota area, will succeed Mr. Snow as assistant sales manager.

American Brake Shoe Co., New York, N. Y., announces expansion of sales activities in Cleveland with the addition of representation for its National Bearing Division. L. E. Hoyer and J. Robert Lottes, sales representatives for that division, will join representatives of the Brake Shoe and Castings, Southern Wheel, and Ramapa Ajax Divisions, under the direction of James J. Nelson, Eastern sales manager for National Bearing.

Kent Machine Co., Cuyahoga Falls, Ohio, announces that A. B. Babbitt, who resigned recently as president of the company and was succeeded by H. T. Young, is now living in Burbank, Calif. He maintains an office in his residence at 809 S. Tenth St., where he will be pleased to see Kent agents and any of his old friends who may be vacationing in California.

Arkell & Smiths, multiwall paper bag manufacturers, Canajoharie, N. Y., has announced the promotion of H. C. Peterson to assistant sales manager, with headquarters in Canajoharie. H. S. Hollingsworth has succeeded Mr. Peterson as sales manager of the Metropolitan New York area.

Goodyear Tire & Rubber Co., Akron, Ohio, has appointed M. W. Sledge assistant manager of the belting sales department, succeeding the late W. P. Hallstein. Mr. Sledge joined the company in 1935.

Allegheny Ludlum Steel Corp., Pittsburgh, Penn., has announced the resignation of Melvin C. Harris as vice-president in charge of production. Pending the election of a successor, C. B. Pollock, production manager, will be in charge of production. Mr. Harris has been with the company since 1915.

Butler Bin Co., Waukesha, Wis., announces the appointment of M. R. Butler, Jr., as general plant superintendent. He was formerly a member of the engineering staff and also served as advertising manager, a position he still retains.

Hyster Co., Portland, Ore., has announced the appointment of Alfred I. Stuart as head of the methods engineering department for the plants in Portland, Ore., Danville and Peoria, Ill.

Nordberg Mfg. Co., Milwaukee, Wis., has announced the appointment of Jack B. Bond as district manager of the Central territory for the crusher and process machinery division, with headquarters in Milwaukee. Mr. Bond attended the University of Wisconsin Engineering School and then joined the crusher and screen engineering and sales department of Galland-Henning Mfg. Co. and H. W. Weimer Co. He joined Nordberg in 1944 as a sales engineer. Mr. Bond is the son of J. S. Bond who was connected with the crushing, mining and cement machinery field for over 30 years with Power & Mining Machinery Co. and Allis-Chalmers Mfg. Co., until his retirement several years ago.

Jack B. Bond

Joseph T. Ryerson & Son, Inc., Chicago, Ill., has announced the appointment of W. A. Redpath as manager of the Philadelphia plant, to succeed C. L. Hardy, who was recently elected assistant vice-president.

Diamond Alkali Co., Cleveland, Ohio, announces that C. S. Hancock, on the sales staff of the Pure Calcium Products Division, Painesville, Ohio, since 1936, has been promoted to manager of calcium carbonate sales.

Vulcan Iron Works, Wilkes-Barre, Penn., announces that Ralph O. Smith, general sales manager, has resigned

SYNTRON

Speeds Up Bulk Material Handling

"Vibra-Flow"

VIBRATORY FEEDERS

Will Handle — most all types of bulk materials — ore, rock, chemicals, coal, sand, etc. — hot or cold — dry or damp.

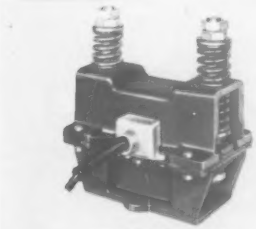
At — variably controlled rates from pounds to hundreds of tons per hour — from 110, 220 or 440 volt, 50 or 60 cycle.

To — crushers, ball mills, driers, screens, belt conveyors and other processing equipment.

Write for literature

SYNTRON CO.

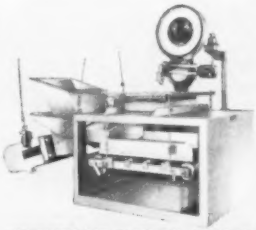
450 Lexington, Homer City, Pa.



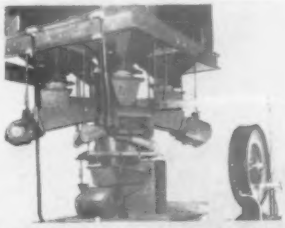
BIN VIBRATORS
Make Stubborn Materials Flow Freely

VIBRATING GRIZZLIES
Both Feed and Scalp
With One Unit

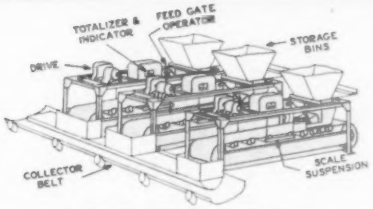
LONG "Vibratory" CONVEYORS
No Motors, Gears or Other
Mechanical Wearing Parts



"CONSTANT WEIGH" FEEDERS
Accurate, Continuous Feed
by Weight



"Automatic" BATCH WEIGHING
Scale—Controlled Vibratory Feeders



AUTOMATIC CONTINUOUS PROPORTIONING

TRANSPORTOFEEDERS AUTOMATICALLY AND CONTINUOUSLY TRANSPORT WEIGH INDICATE INTEGRATE TOTALIZE TONNAGE AND MAINTAIN PRESET FEED RATE

SINTERING MACHINERY CORP.
Transportometer Division

70 PINE STREET
New York 5, N. Y.

8 GILSON FEATURES

1. Makes test quickly and accurately
2. Two to seven separations simultaneously
3. Screen trays independently removable
4. Trays balanced to same tare weight
5. Visible separation to refusal
6. Few moving parts
7. Sturdy construction
8. Size range 4" to 200-mesh

GILSON Mechanical Testing Screen

• This machine is designed for the efficient sizing of test samples of crushed stone, gravel, slag and similar materials. It accommodates samples up to one cubic foot, making from two to seven separations simultaneously, in five minutes or less.

Smaller amounts of very fine materials may be handled efficiently and the screen used for research or other special mass separation jobs down to 100-mesh or finer.

Where exacting specifications are required the Gilson Screen eliminates guesswork—avoids errors and reduces operating delays. A controlled and truly guaranteed product is now possible with the Gilson Testing Screen. For fast accurate sizing of coarse or fines from 4" to 200-mesh specify a Gilson Testing Screen.

GILSON SCREEN CO. BOX 186 MERCER, PENNA.

FAMOUS EXAMPLES OF ARMORED CONSTRUCTION

1. U. S. ARMY "GENERAL PATTON" TANK

2. AMERICAN HEAVY DUTY UTILITY SNATCH BLOCK

9302

Dropped, slammed and battered on the job, blocks and sheaves have to be tough! *Armored Construction* makes AMERICAN Heavy Duty Utility Snatch Blocks serve better, last longer. Rigged quickly, too . . . just lift the hook and lay in the rope. In three sheave sizes, ten-ton capacity, handling up to ⅞" wire rope. Sold by distributors everywhere. Made by AMERICAN HOIST AND DERRICK CO., St. Paul 1, Minn.

ALSO MAKERS OF THE AMERICAN HANDIWINCH AND GENUINE CROSBY CLIPS

ASK FOR **AMERICAN BLOCKS AND SHEAVES**

to accept the position of president of the Wilkes-Barre Iron Manufacturing Co., Wilkes-Barre, Penn.

Caterpillar Tractor Co., Peoria, Ill., has under construction in Indianapolis, Ind., a new parts depot to serve distributors in Indiana, Illinois, Wisconsin, Michigan, Iowa, Missouri, Kentucky, Ohio, Tennessee, Pennsylvania, West Virginia, Virginia and Maryland in addition to Ontario and Quebec, Canada. The depot is expected to be completed this summer.

Gar Wood Industries, Inc., Wayne, Mich., announces that Edward F. Fisher, one of the Fisher brothers who founded Fisher Body, now a division of General Motors Corp., has been elected president of the company, after four years of retirement. Mr. Fisher will head an organization made up of four divisions located in Wayne, Mich.; Findlay, Ohio; Minneapolis, Minn.; and Richmond, Calif.

Edward B. Hill

Edward B. Hill has been appointed vice-president in charge of sales. He was formerly general sales manager. Mr. Hill is one of the oldest employes of the company, having started with the Wood Hydraulic Hoist & Body Co., predecessors to Gar Wood Industries, Inc., in 1926, as a mechanic helper. He was made salesman at the Los Angeles branch in 1927 and later appointed branch manager at Seattle, New York and Chicago. During the war years, Mr. Hill was manager of the Chicago district, where he also supervised manufacturing of Gar Wood products for the war effort. He returned to the factory sales organization in 1947 as general sales manager to supervise sales activities of the Findlay, St. Paul and Wayne divisions.

F. H. McGraw & Co., national engineering and construction firm with offices in Hartland, New York, Chicago and Pittsburgh, announces the election of Urban D. Gosselin as vice-president; Harry W. Mathews as assistant to the president; and Frank J. McClean as controller.

Sam Tour & Co., Inc., engineers, metallurgists and consultants, New York, N. Y., has announced the appointment of John J. Meadows as supervisor of the mechanical engineering department.

Davey Compressor Co., Kent, Ohio, announces that J. P. Waite, Inc., Milwaukee, Wis., has been appointed a dealer and will handle all items manufactured by the company.

American Brake Shoe Co., New York, N. Y., has appointed George N. Decker comptroller of the Kellogg Division, with headquarters in Rochester, N. Y. He was formerly assistant comptroller.

CONCRETE PRODUCTS

CONCRETE UNITS · READY-MIXED CONCRETE

Precast concrete floor system in drafting room of Barber and McMurry, Knoxville, Tenn., architects

A SECTION OF ROCK PRODUCTS

CONCRETE PRODUCTS MANUFACTURERS REPORT BETTER BLOCK USING *DURAPLASTIC

CP-D-83

Makers of block and other concrete products report that by using Atlas Duraplastic they can employ a damper mix. They say it's a more cohesive mix, holds together better and feeds easily through machines; finished units exhibit greater resistance to passage and absorption of water. For machine-made products —block, pipe, brick, draintile, silo staves, etc.—these are outstanding advantages.

For superior concrete products at no extra cost, use Atlas Duraplastic cement. It complies with ASTM and Federal specifications and sells at the same price as regular cement. No unusual changes in procedure are required. Send for further information. Write to Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Bldg., New York 17, N.Y.

OFFICES: Albany, Birmingham, Boston, Chicago, Dayton, Des Moines, Kansas City, Minneapolis, New York, Philadelphia, Pittsburgh, St. Louis, Waco.

*Duraplastic is the registered trade mark of the air-entraining portland cement manufactured by Universal Atlas Cement Co.

ATLAS DURAPLASTIC

TRADE MARK REG. U. A. C. CO.

AIR-ENTRAINING PORTLAND CEMENT

MAKES SUPERIOR CONCRETE PRODUCTS AT NO EXTRA COST

"THE THEATRE GUILD ON THE AIR"—*Sponsored by U. S. Steel Subsidiaries—Sunday Evenings—ABC Network*

YOUR COSTS COME DOWN WITH *EVEREADY* BRIKSAW

Cut WET or DRY

Now you can have *Dust-Free* masonry cutting *whenever you want it!* Take your choice of EVEREADY BRIKSAW completely equipped—Or *reduce first costs* by buying BRIKSAW for standard dry cutting only—Later *install inexpensive Wet Cutting Kit.*

4 seconds to adjust Cutting Head height! Patented "Adjusta-Height" is that fast. Exclusive "Toe-Matic" Head angularity control lets you make any cut in any size material—FAST! One-piece Cutting Head removed in 21 seconds for portability anywhere.

WRITE FOR NAME OF NEAREST DISTRIBUTOR

LOW COST in FIRST COST in OPERATING COST

ANY CUTTING POSITION

With *effortless speed* you shift the Cutting Head from one "Adjusta-Height" Notch to another to cut: Quarry Tile—Brick—Partition Tile—Concrete Block.

AUTOMATIC BLADE PRESSURE

Longer blade life, faster cutting with patented Blade Pressure Equalizer Spring that ***automatically adjusts*** blade cutting pressure.

INSTANT "HEAD LOCK"

A few turns of the handle ***locks head in a fixed position.***

EXCLUSIVE "TOE-MATIC"

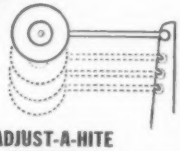
A light upward tilt of the Foot Treadle—and you ***set Head to any desired angularity.***

EVEREADY BRIKSAW BLADES

***For every masonry material*—from Bricks to Porcelain; from Glazed Tile to Concrete Blocks—there is an EVEREADY BRIKSAW Blade (Abrasive or Diamond) to give *top cutting performance* WET or DRY.**

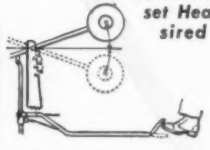
On almost every masonry material, operator has HIS choice of these different cutting actions:

1. *Standard Cutting Speed*—*standard blade life.* 2. *Faster Cutting Speed*—somewhat shorter blade life. 3. *Longer Blade Life*—somewhat slower cutting speed. *Remember:* There is an EVEREADY BRIKSAW Blade for *any and every type of masonry cutting!*



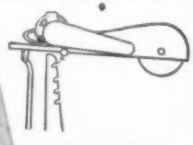
ADJUST-A-HITE CONTROL

In 4 seconds adjust Head-height for Quarry Tile—Brick—Glazed Tile—Concrete Block.



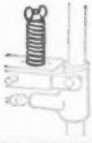
TOE-MATIC FOOT TREADLE

Lift up with tip of toe ***to adjust Head*—Then *press down to cut.***



PORTABLE

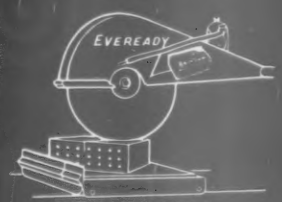
In 21 seconds remove one-piece Cutting Head for ready portability.



BLADE PRESSURE EQUALIZER SPRING

Automatically adjusts blade pressure—***Longer blade life, faster cutting.***

SIGN AND MAIL NOW

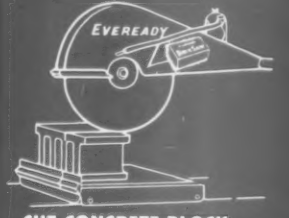


CUT GLAZED TILE IN 21 SECONDS

CUT FACE BRICK IN 11 SECONDS

CUT GLASS BLOCK IN 8 SECONDS

CUT FIRE BRICK IN 4 SECONDS



CUT CONCRETE BLOCK IN 19 SECONDS

EVEREADY BRIKSAW COMPANY
1503 S. Michigan Boulevard, Chicago 5, Ill.

Without obligation send information on EVEREADY BRIKSAW and Blades for cutting:

NAME _____

STREET _____

CITY _____ STATE _____

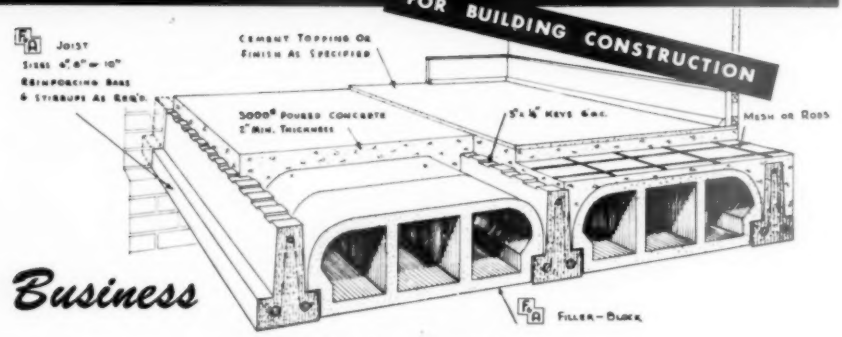
EVEREADY BRIKSAW COMPANY

1503 S. MICHIGAN BLVD. CHICAGO 5, ILLINOIS

It's BIGGER than Your Block Market!

F & A

FOR BUILDING CONSTRUCTION



MEANS *Volume Business*

BECAUSE . . . .

ECONOMICAL — Practically a dry system requiring only semi-skilled labor for installation and no forming.

SPEEDY ERECTION — provides an immediate working deck for other trades.

FLEXIBILITY of installation of all services — electric, plumbing, heating, etc.

REDUCES DEAD WEIGHT with the hollow block.

DEVELOPS T-BEAM ACTION in the joists.

FIREPROOF — withstands standard 4-hour fire and water test.

WIDE LATITUDE IN DESIGN for any necessary superimposed load.

INSULATING PROPERTIES against heat transfer.

ADAPTABLE to any specified finish — both floor and ceiling.

Seven concrete products plants now producing F & A System Products in the Southeast are operating at *full capacity* to meet demand.

SCOPE OF SYSTEM

F & A Roof and Floor System, an entirely new development in prefabricated building construction, uses a combination of inverted T-joists and filler blocks of precast-concrete, and a poured-in-place top slab.

RESEARCH DEVELOPMENT

It was perfected through years of research by F & A Laboratories, Inc., Greensboro, N. C., jointly organized by these leaders in the Concrete Products Industry:

Otto and Paul Formigli, Formigli Brothers, Inc., Phila. Penna.
M. A. Arnold, Arnold Stone Co., Greensboro, N. C.
J. W. Warren, Sr., Southern Cast Stone Co., Knoxville, Tenn.

BIG POTENTIAL MARKET

Initial acceptance already indicates a potential demand far bigger than the market for concrete block.

EASILY ADAPTED

Any concrete products plant equipped with standard high-production, plain-pallet, 3-block equipment can get into production quickly. The only special equipment required is (1) F & A Mold Box Attachment for filler blocks, (2) F & A Joist Forms and Multiple Vibrating Cradles for joists.

ACCEPTED AND PROVEN

Leading architects who have examined the F & A System are enthusiastic over its possibilities. They are already writing it into their specifications where F & A Products are available.

Exclusive Territorial Rights which include Sales and Engineering Consultation are now available to merchandising-minded concrete products producers. Acceptance of future developments of F & A Laboratories, Inc., are optional.

DISTRIBUTED BY

INDUSTRY NEWS

Effects of $CaCl_2$ in Portland Cement Mixes

SOLVAY SALES DIVISION, Allied Chemical & Dye Corp., has issued a new 40-page, semi-technical booklet, which condenses from research and technical reports the effects of adding measured quantities of calcium chloride to portland cement mixes. Tables, graphs and charts covering setting time, early strength, curing, slump, density, surface wear, shrinkage, and ultimate strength are included. Also shown are effects of varying temperatures and cold weather, and the results with special cements including air entraining, high early strength, and low heat cements. Copies of the booklet may be obtained free from Solvay Sales Division, 40 Rector Street, New York 6, N. Y.

N.R.M.C.A., N.S.G.A. Fellowships

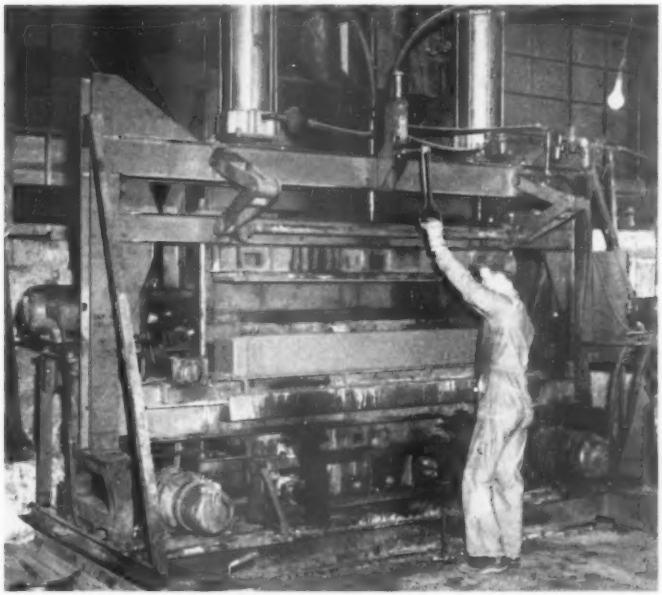
BOTH the National Ready Mixed Concrete Association and the National Sand and Gravel Association plan to sponsor graduate fellowships at the University of Maryland during the academic years 1949-50 and 1950-51, it has been announced. The Fellowships are open to qualified graduates in engineering from accredited colleges and universities.

Proportioning Concrete

NATIONAL CRUSHED STONE ASSOCIATION has announced a revised issue of Bulletin No. 11, "A Method of Proportioning Concrete for Strength, Workability, and Durability." There is no alteration in the basic principles for concrete proportioning contained in the 1942 bulletin, according to the association, but air entrainment as a means for greatly improving concrete durability and workability is taken into account in the N.C.S.A. method of proportioning concrete. The bulletin has been prepared by A. T. Goldbeck, engineering director, and J. E. Gray, field engineer, of the association.

Pumice Block

LAWRENCE BROTHERS CONCRETE PRODUCTS CO., Winfield, Kan., is delivering concrete products within a radius of 75 miles. The company, which was organized approximately two years ago, is now concentrating the greater part of its activities on the production of pumice block.



Universal Concrete Pipe Co., Columbus, Ohio, has built, for its own use, what is said to be the first concrete cribbing machine in the country. During a 6½-hr. period, 132 six-ft. "header" type pieces can be made on the machine. The units are used for railroad embankment retaining walls, flood control and levees, soil erosion work, loading docks, bridge abutments, and the like. Clyde Wilson, crib machine operator, is shown pulling the lever that raises a "header" from the tamping groove after forming

Block Plant Expands

WALTER C. BEST, president of Walter C. Best, Inc., and Bestone, Inc., manufacturers of concrete block, has announced construction of a new processing plant at Chardon, Ohio, for the production of various sacked materials including Bestmix, a blend of silica sand, cement and lime, to be marketed in 80-lb. bags as a premixed mortar for the laying of block, tile and other masonry materials. Bestcrete, a companion product consisting of silica sand, silica stone, cement, etc., for small concrete jobs, also will be manufactured at the plant as well as play box sand, garden pebbles, blast sand.

MIDWAY CONCRETE PRODUCTS, INC., Fond du Lac, Wis., has been organized to manufacture concrete products by Kingsley Nelson, Edwin Keiser and R. F. Kulibert. Capital is listed as $500 with 250 shares, par value $100.

HIGHWAY CONCRETE PIPE CO., Mt. Sterling, Ky., has been organized with $20,000 common stock and 100 shares of no-par preferred stock. R. J. Reynolds, Esther Clay and William C. Clay, Jr., are the principals.

MICKELSON CONCRETE PRODUCTS CO., Austin, Minn., has resumed the manufacture of concrete drain tile. The company also produces concrete block.

MINNEOPA CONCRETE PRODUCTS CO. has started the manufacture of "pyramid" pumice concrete block at Mankato, Minn. Plant capacity is 5000 block per 8-hr. day. C. T. Rudberg is general manager.

VANDER HEYDEN, INC., Milwaukee, Wis., is producing concrete block at the rate of 2000 per hr., and can furnish 1600 sq. ft. of concrete planks in the same amount of time, according to Bernard Vander Heyden, vice-president of the firm. The "plank" department turns out units up to 17 ft. in length. The company currently is planning an economy masonry home.

ELK RIVER CONCRETE PRODUCTS, INC., Austin, Minn., was damaged to the extent of $10,000 in a recent fire.

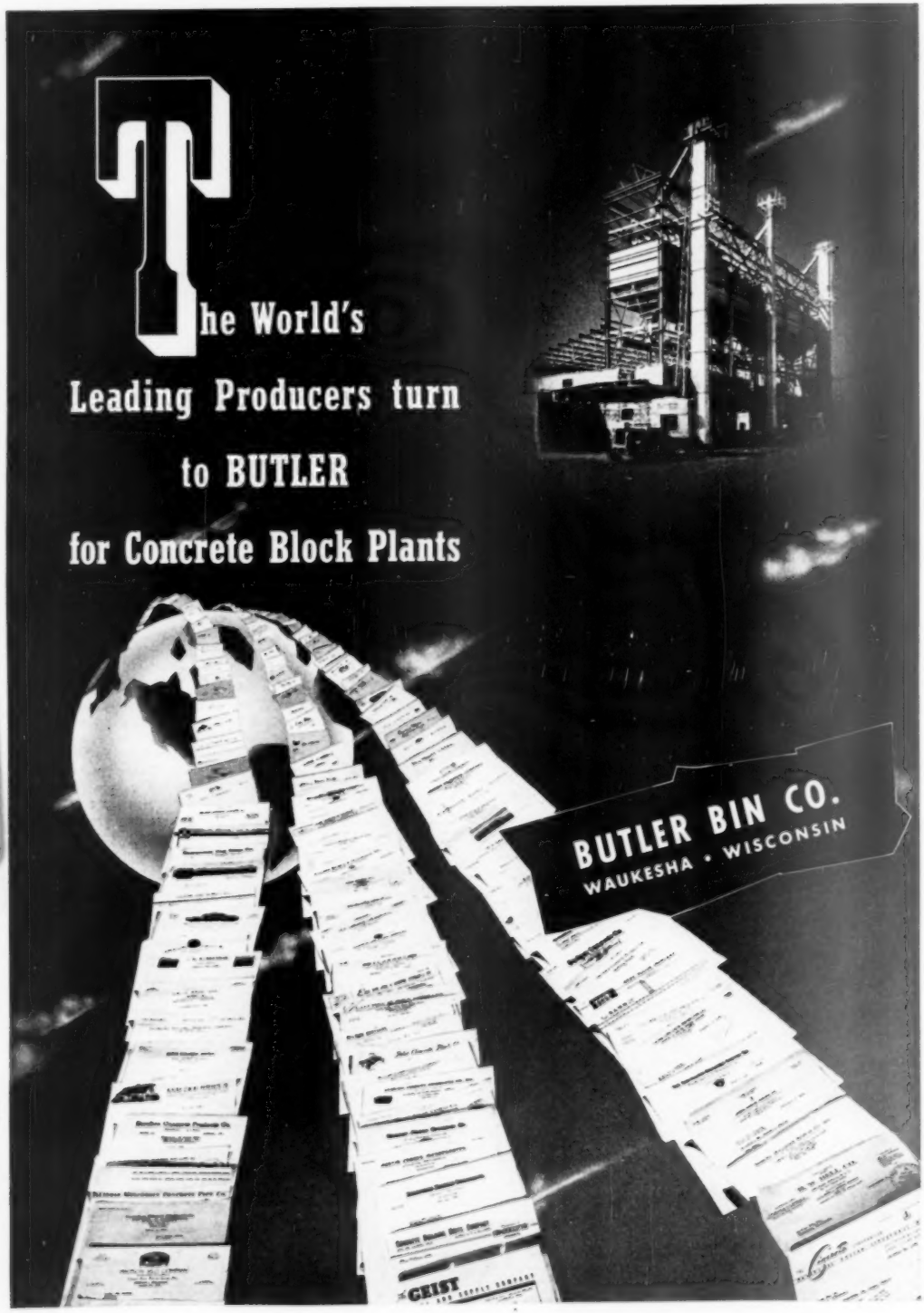
MERLIN WAGGONER has opened a ready-mix concrete plant at Hawarden, Iowa.

WORTHINGTON READY-MIXED CONCRETE CO., Worthington, Minn., has been purchased by Hudson Brothers. W. H. Rohweder will remain in charge.

L. D. GUSTAFSON AND ED BRANDT have installed a new block machine at their concrete block plant near Virginia, Minn.

HARVEY DRENGLER, co-partner in the D. & S. Concrete Co., Wausau, Wis., has announced purchase of the Building Block Supply Co., Wausau, from R. J. Pollock.

NORTH DAKOTA CONCRETE PRODUCTS CO., Minot, N. D., has completed construction of a new 72- x 100-ft. building. The company, which fabricates concrete road culverts, sewer pipe and well casings, also maintains plants at Bismarck and Williston.


The World's
Leading Producers turn
to BUTLER
for Concrete Block Plants
BUTLER BIN CO.
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GEIST

New Board of Directors

Concrete Pipe Manufacturers Meet in Richmond

Informal discussions and technical papers featured in business sessions. Historical points of interest highlighted entertainment program

THE AMERICAN CONCRETE PIPE ASSOCIATION held its forty-first annual convention at the John Marshall Hotel, Richmond, Va., March 10 to 13. The meeting was well attended, with representation from the more important concrete pipe manufacturing cities of the United States and Canada, as well as some manufacturers from abroad. Everyone seemed to have the impression that this was one of the best meetings held, as a well-balanced program of important and technical papers was scheduled, and unusual recreation and sight-seeing facilities were provided by the program committee. J. A. Dunn, president of the Association and Harry W. Easterly, chairman of the program committee and of Concrete Pipe & Products Co., Richmond, Va., were responsible for the arrangements. Aside from a few hours of inclement weather on one day, conditions were ideal so that the trip to the various points of historical interest in and around Richmond all added up to a most successful meeting. Next year the association will hold its annual meeting in San Francisco, Calif., and it is our opinion that the California hosts will have to get out and hustle to stage a better or more interesting convention than Virginia extended to the visitors this year.

Dr. Lorenz G. Straub, University of Minnesota, Minneapolis, Minn.

Officers

The following members were elected as officers and to the board of directors of the association: J. A. Dunn, Hume Pipe of New England, Inc., Swampscott, Mass., president; D. A. Dunkle, American Pipe and Construction Co., Los Angeles, Calif.; E. H. Erby, Elk River Concrete Products Co. of Montana, and P. R. Hirsch, Lock Joint Pipe Co., East Orange, N. J., vice-presidents; G. B. Denham, Faulkner Concrete Pipe Co., Hattiesburg Miss., secretary; C. H. Bullen, Midwest Concrete Pipe Co., Chicago, Ill., treasurer; G. F Lillie, Platte Valley Cement Tile Co., Scottsbluff, Neb.; I. H. Smith, Sherman Concrete Pipe Co. of Florida, Jacksonville; H. A. Weigand, United Concrete Pipe Corp., Baldwin Park, Calif.; E. L. Johnson, Concrete Conduit Co., Colton, Calif.; H. S. Price, Jr, Price Brothers Co., Dayton, Ohio; H. W. Easterly, Concrete Pipe & Products Co., Richmond, Va.; H. P. Ford, Eugene Concrete Pipe and Products Co., Eugene, Ore.; H. X. Eschenbrenner, Universal Concrete Pipe Co., Columbus, Ohio; and E. H. Fox, Cincinnati Concrete Pipe Co., Cincinnati, Ohio.

Many of the visitors took this opportunity to visit the plant of Mr. Easterly, where a Hume pipe machine is in operation. The plant also features Besser block equipment and high pressure steam curing.

Registration for board members and early arrivals featured most of the opening day's activities and, that evening, the board and past-presidents had a dinner at the Commonwealth Club of Richmond that started the social activities of the meeting. Thursday, March 10, was devoted to registration and board meetings. That afternoon the group was taken in buses to the Richmond Shooting Club where an old fashioned shad bake was featured. Rains early in the afternoon did not dampen the interest of the guests nor the enthusiasm of the hosts in demonstrating how shad could be cooked on oak planks before an open fire. Kegs of cold beer, cocktails, old fashioned Brunswick stew cooked in pots over an open fire, negro entertainers, including a band of young colored boys whose instruments (tin pans, wash tub, wash board, spoons and what not) represented an investment of possibly 50 cents, all combined to give the second day a colorful ending.

Friday morning's session was devoted to the business of the associa-

W. J. Schlick, research professor of civil engineering, Iowa State College, Ames, Iowa

Carl F. Izzard, highway research engineer, Washington, D. C.

tion. Mr. Fox presided over an afternoon informal floor discussion of subjects of interest to the industry. The report on density tests led by Lewis G. Thomas related to methods of testing pipe. Some advocated tamping test cylinders in a manner comparable to the tamping of pipe. Discussion brought out that some plant control might be accomplished by breaking such cylinders instead of testing pipe to the point of failure. Chairman Fox told of an extreme case of concrete expansion due to using a certain aggregate with a certain cement and whereby a specimen 10-in. long expanded one inch. Howard F. Peckworth, executive director of the American Concrete Pipe Association, spoke briefly on the effect of reactive aggregates as observed at Parker Dam on the lower Colorado river but he found no pipe damage anywhere due to such reactive materials when used with high alkali cements.

One member asked from the floor if sulphate-resisting cements were working out satisfactorily. He did not want laboratory data but wanted field results. Mr. Johnson told of conditions in the Imperial Valley of California which is 240 ft. below sea level and where unusual alkali soil conditions exist. He said ordinary irrigation pipe lasted about two years under those conditions, but that the use of sulphate-resisting cement resulted in pipe that was in good shape after three years—but that did have a little surface checking. Mr. Johnson also told briefly of the large amount of pipe being installed in the Imperial and Coachilla valleys.

Friday's activities concluded with a reception, cocktail party and entertainment at the Country Club of Virginia. The members were the guests of the Manufacturers of Welded Wire Fabric. A buffet supper and dancing followed the cocktail party.

Technical Session

Saturday was devoted almost entirely to technical papers, with Mr. Dunn presiding. The first speaker was W. J. Schlick, research professor of civil engineering, Iowa State College, who spoke on the basic theories and the relationships of loads and supporting strengths of rigid pipe conduits. His paper was a technical discussion, amplified by slides and charts, illustrating the basic theories and emphasizing that the sides of a ditch have some supporting values. Thus, a narrow ditch with firm walls carries part of the load that otherwise might be carried by the pipe.

The second speaker was M. G. Spangler, research professor of civil engineering, Iowa State College, whose paper amplified that of Professor Schlick. He further outlined theories relating to loads and supporting strength with relevant data relating to estimating safe heights of

M. G. Spangler, research professor of civil engineering, Iowa State College, Ames, Iowa

fill over a proposed conduit. His symposium outlined the various physical factors which influence the load and height of fill, and to point out the extent of the influence of each factor. The paper also contained a discussion of the meaning of "safe height of fill" and presented the author's views as to considerations which are important in choosing an appropriate factor of safety in the design of rigid conduits. The morning session ended with a talk by E. F. Kelley, chief, division of physical research, Public Roads Administration, entitled "Some Unsolved Problems Relating to Concrete Pipe." Mr. Kelly dwelt at considerable length on the changes in specifications over the past years.

At the noon luncheon, Col. Dunn of the Corps of Engineers told of the "Military Activities of the Corps of Engineers" and gave a resume of what the corps has done during the past years. At the afternoon session, Dr. Lorenz G. Straub, University of Minnesota, gave a paper on "Practical Hydraulics of Highway Culverts." Dr. Straub was followed by Carl F. Izzard, highway research engineer, Public Roads Administration, who spoke on "Trends in Estimating Rates of Run-Off."

Saturday evening was a reception and cocktail party followed by the annual banquet at which time Lt. General Robert L. Eichelberger, U. S. Army, spoke of "The Importance of Japan to the United States." He gave an interesting and illuminating talk on postwar Japan and strongly indicated the value of Japan to us, should we have trouble with a foreign power. The evening ended with entertainment and dancing.

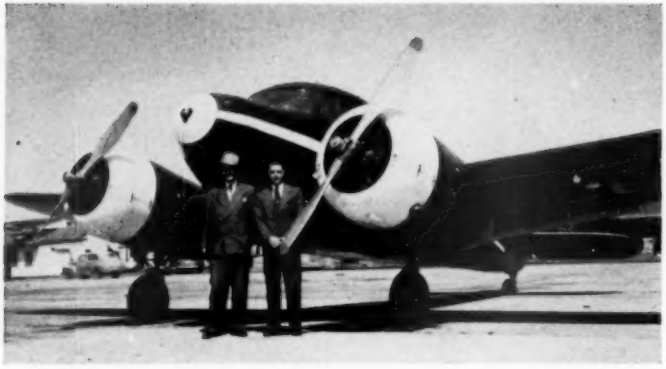
Sunday was devoted to a trip to Williamsburg, Va., which was the capital of the colonies prior to the Revolutionary War. The ravages of time had practically destroyed the city, but the Rockefeller family has undertaken its restoration. Much of the work has been completed and the members of the association visited the restored buildings, where competent guides explained significant points of interest. The day and the meeting ended with a get-together in the Game Room of the historic Williamsburg Inn.

Record Lime Sales

SALES OF LIME in 1947 expanded to a record total of 6,778,979 tons, according to figures submitted by producers to the Bureau of Mines. This output was 13 percent greater than in 1946 and exceeded the historical 1943 record by 3 percent. Of the total sales, 74 percent were in the form of quicklime and 26 percent hydrated. Average value per ton for quicklime increased from $8.27 in 1946 to $9.04 in 1947; hydrated advanced from $9.15 to $10.50. Dead-burned dolomite sales increased by 29 percent.

E. D. Rowe seems a little remorseful at his plight, but his wife apparently is enjoying the stocks at the old Williamsburg jail

Pictured above are formal and informal scenes taken at the 41st annual convention of the American Concrete Pipe Association, held recently at the John Marshall hotel, Richmond, Va. No. 1: Marion Streccius of the association office, Chicago, registers some early arrivals, left to right, H. W. Easterly, Richmond, Va., one of the hosts; D. A. Dunkle, Los Angeles, Calif.; and Howard Schurmann, Indianapolis, Ind. No. 2: J. A. Dunn, Swampscott, Mass., president of the association, speaks before one of the sessions, while to the right are Lt. General Robert L. Eichelberger, U. S. Army and Mrs. Dunn. No. 3: Lewis G. Thomas, Oklahoma City, Oklahoma, presents a paper, while to the right are E. H. Fox, Cincinnati, Ohio; Harry S. Price, Jr., Dayton, Ohio; and E. F. Bespalow, Memphis, Tenn. No. 4: Members of the association enjoying a shad bake at the Richmond Shooting Club, left to right, Mrs. H. W. Easterly, Howard F. Peckworth, managing director of the association, Chicago, and C. H. Bullen, Chicago, Ill. No. 5: Waiting on themselves at a buffet dinner are Ray A. Foley, Dallas, Texas, and Elmer L. Johnson, Colton, Calif., standing behind their wives, in the same order. No. 6: At a table at one of the dinners, left to right, are Abner Robertson, Richmond, Va.; Marion Streccius; Earl W. Klein, Hartford, Conn.; Harold Leuliette, New York City; Marjorie Congleton, Chicago; Dr. Lorenz G. Straub, Minneapolis, Minn.; Mrs. Robertson, Willis F. Perley, assistant to Mr. Peckworth of the association, Chicago; and Howard F. Peckworth



Roy Darden, left, with pilot C. E. Eberhart standing in front of Cessna plane bought to service customers more quickly

Precast Floor, Roof Systems

THE PRECAST concrete roof and floor system illustrated herewith and on the cover of this issue of CONCRETE PRODUCTS is a development of F & A Laboratories, Inc., which was organized by Formigli Brothers, Inc., Philadelphia, Penn., Arnold Stone Co., Greensboro, N. C., and Southern Cast Stone Co., Knoxville, Tenn., three of the nation's outstanding manufacturers of concrete products.

The F & A roof and floor system is a combination of precast concrete joists and filler block and a poured-in-place concrete top slab, designed for low dead weight so that the upper portion of the joists is embedded into the covering concrete slab to provide the bond necessary to produce T-beam action.

Many advantages are claimed for this system. It is designed to standard reinforced concrete principles in order to conform to required superimposed loads for variable spans and is fireproof construction. The system, while new, has been classified as a fireproof floor and rated for minimum fire insurance rates. Consisting largely of hollow concrete filler block, good sound and heat insulation and ease of placement of piping and conduits are attainable with this class of construction. Plaster or paint may be applied directly to the flat ceilings provided, or the units may be left exposed and pointed to give the appearance of a finished ceiling with good sound absorption properties. It is claimed that the F & A floor system can be erected quickly by semi-skilled labor and that a working deck for other building trades is provided immediately after placement. A single row of shoring along the center of each joist is the only special requirement for support during laying, and double or triple joists are placed to support partitions where heavier than ordinary loads are superimposed.

This system of floor and roof construction is being made available to selected concerns which will be awarded exclusive rights to its manufacture and sale within a given territory. Equipment includes vibrating-type joist manufacturing equipment, and special mold boxes to be applied to any high-production plain pallet concrete block machine for the manufacture of the filler block.

According to the franchising arrangement, joists would be manufactured in the plant of the licensee, who is then at liberty, if he wishes, to have the filler block made by other concerns within his territory which are strategically located with respect to construction projects on which the system is specified.

Roy Darden Industries, Atlanta, Ga., concrete products machinery manufacturer, is the licensor and exclusive distributor of the necessary equipment for manufacture. Among the services provided are assistance in the establishment of manufacturing methods in a given plant, service and assistance in the promotion of sales to architects and engineers until sufficient volume of business has been developed to require full-time company personnel. The plan calls for service calls on each licensee at least once a month.

In addition to the three originating concerns, the system is now in production at the plants of Hamilton Concrete Products Co., Chattanooga, Tenn.; Louisiana Concrete Products Co., Baton Rouge, La.; Alabama Cement Tile Co., Birmingham, Ala.; and Builders Concrete Products, Inc., Atlanta, Ga. According to reports, the system has gained acceptance by leading architects in all of these territories for residences, hospitals, schools, commercial and industrial buildings.

Concrete Block Contract

J. E. EVANS CONCRETE PRODUCTS, INC., Shelbyville, Ind., has been granted a contract to supply block for a government housing project entailing the construction of 500 low-cost dwellings near Indianapolis, Ind. Paul Welsh is president and owner of the firm.

Concrete Products Firm

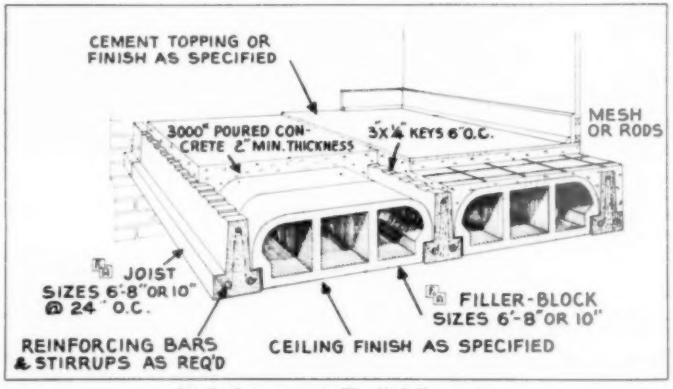
READY-CRETE, INC., Milwaukee, Wis., has been incorporated to manufacture concrete products by Robert P. Yeomans, Charles H. Oldfather, Jr., and James P. Brody. Capital stock is listed as $500, with 1000 shares, no par value.

Establish New Plant

BETHANY FALL TRANSIT CONCRETE CO., with headquarters at Bethany, Mo., is establishing a new plant at Cameron, Mo., for the manufacture of ready-mixed concrete.

Opens Gravel Plant

ANDERSEN WASHED SAND AND GRAVEL CO., has been established at Sterling, Colo., by Don Andersen.


CEMENT TOPPING OR FINISH AS SPECIFIED
3000# POURED CONCRETE 2" MIN. THICKNESS
3"x4" KEYS 6' O.C.
MESH OR RODS
JOIST SIZES 6"-8" OR 10" @ 24" O.C.
FILLER-BLOCK SIZES 6"-8" OR 10"
REINFORCING BARS & STIRRUPS AS REQ'D
CEILING FINISH AS SPECIFIED

Details of new concrete filler block floor system

North Carolina Concrete Masonry Meeting

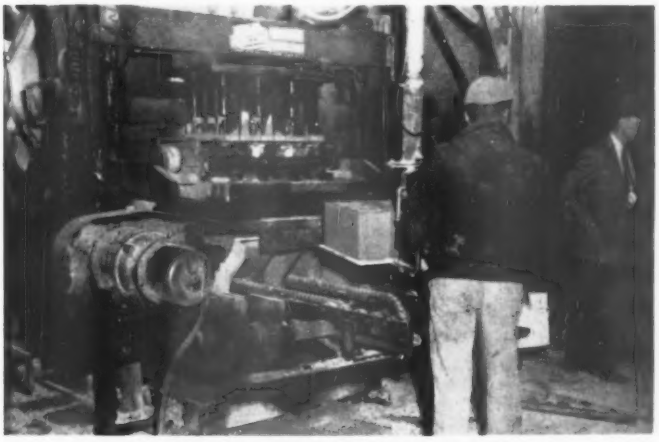
THE North Carolina Concrete Masonry Association held its spring meeting at the Hotel Kinston, Kinston, N. C., on March 16. This organization will soon enter into its third year of existence and meetings are held at various points about the state every two or three months.

State Cement Plant

The meeting was of interest to our readers as a whole because it brought to the surface and considered State Cement Plant Bill H. B. 211. This is a measure which, if carried to a conclusion, could result in the State of North Carolina going into the portland cement business. It developed during the discussion that such a measure had been on the agenda at Raleigh for some time and early in March of this year the governor appointed a committee to investigate the subject and report back. Some seemed to think that the procedures through which such a bill must go amounted to a delay in any definite steps for at least a year and, by that time, due to proposed construction of a new plant (possibly two plants) in neighboring states, and due to the portland cement that is now coming from a new plant just getting under way in South Carolina, that the needs of the area would be satisfied. J. C. Brewer, Pennsylvania-Dixie Cement Corp., expressed concern over the state going into private business because of the possibility of the program extending into other lines such as concrete block manufacture and concrete pipe. H. M. Shaw, North Carolina Products, Inc., Raleigh, former president of the association, concurred and felt that no attempt should be made to support the bill.

L. J. Badgett, left, and H. J. Stockard, Jr., president and secretary-treasurer, respectively, of the North Carolina Concrete Masonry Association

After the meeting members of the association visited the plant of C. K. Smith, president, Smith Concrete Products, Kinston, N. C., as his guest



An automatic block machine in the plant visited by the group

Masonry Inspector

H. J. Stockard, Jr., secretary-treasurer of the association, reviewed the "State Inspector of Concrete Masonry Bill." This is a measure sponsored by the association and is essentially a self-imposed policing of their plants' output to insure production of a high quality material. Means of financing the proposal were discussed.

Mr. Shaw urged members to produce units of high quality so as not to result in having their block re-rated by the Fire Insurance Bureau. Previous reports indicated such to be the case in some localities, because units sold as concrete block did not contain sufficient coarse aggregate to raise them out of the so-called cement block classification.

Cement Supply

J. C. Brewer spoke briefly on the cement supply picture for 1949 and he indicated that this would be another year of short supply, with the possibility that the shortage might come earlier this year than last. This would be due to building, locally and nationally, proceeding at a high level because of favorable weather. Hence, cement manufacturers had not been able to build up sufficient stocks for summer use.

(Continued on page 118)

Another speaker was John Gemmel of the Portland Cement Association who spoke briefly on the subject of holding a "Quality Cement School" in North Carolina at some future, early, date. Walter B. Lenhart, associate editor of ROCK PRODUCTS, gave a short talk on pumice, perlite and other lightweight aggregates as found in the Western areas.

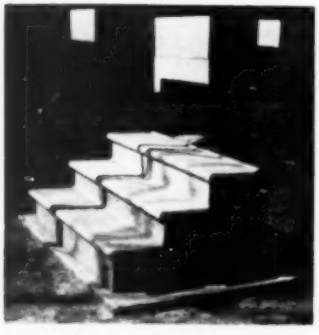
Plant Visit

During the afternoon the group was the guest of C. K. Smith, president, Smith Concrete Products, Inc., Kinston, who conducted them to his plant. The party was impressed with the neatness and orderliness of this plant that features a Besser Vibrapac block machine, steam curing rooms, two motor lift trucks and covered storage space for outside curing of block. The plant also manufactures a wide line of precast concrete units including steps, septic tanks, watering troughs and other items.

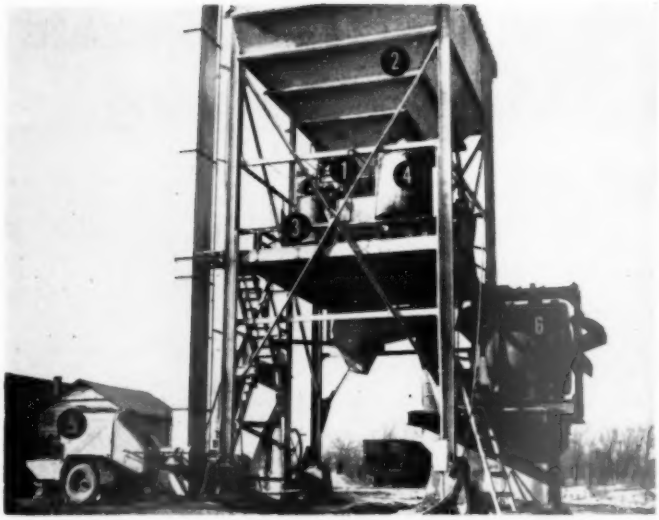
The next meeting will be held at Mt. Airy, N. C., where members will be guests of L. J. Badgett, association president.

Following is a list of those in attendance:

L. J. Badgett, Badgett Concrete Products, Mount Airy
H. M. Shaw, N. C. Products, Inc., Raleigh
C. K. Smith, T. F. Marrow, John Kelly, Smith Concrete Products, Inc., Kinston
R. C. Derby, Southern Concrete Products, Inc., Rocky Mount
T. F. Bradshaw, Point Peter Concrete, Inc., Wilmington
L. W. Stallings, Veteran Building Block Co., Winston-Salem
A. H. Phillips, A. F. Perkins, Fayetteville Concrete Block Co., Fayetteville
Archie Howard, Clyde Upchurch, Hoke Concrete Works, Raeford
R. C. Adams, Adams Concrete Products Co., Varina
Richard Weaver, G. T. Bartholomew, Linville's, Inc., Wilson
C. S. Thompson, Thompson Coal Co., Inc., Roanoke Rapids
H. J. Stockard, Jr., N.C.C.M.A., Raleigh
Walter Lenhart, associate editor, **Rock Products**, Chicago
John Gemmell, Portland Cement Association, Raleigh
J. C. Brewer, Penn-Dixie Cement Co., Guilford
J. T. Patrick, A.G.C. Apprentice Training Council, Durham
A. Zuckor, Roanoke Rapids



Members of the association were interested in the concrete steps and the septic tanks, background



Plant of North Shore Ready-Mix Co. where mixing operations can get underway in one hr. with the temperature as low as 15 deg. F. above zero. The picture was taken before the plant was completely enclosed. Numbers are referred to in the text

Ready-Mix Plant Built For Year Round Operation

High speed steam generation key to uninterrupted cold weather operation

NORTH SHORE READY-MIX CO. last summer set up a ready-mixed concrete plant at Highland Park, Ill. Equipment being used includes a four-car capacity bin for cement and aggregates, and a 2½-cu. yd. concrete mixer. The bins are filled by bucket elevator. Water for the mixer is supplied from an 800-gal. tank located on a platform just below the bins and above the mixer. The mixer (6) discharges concrete into 2- or 4-cu. yd. open top concrete trucks.

Uninterrupted winter weather operations were emphasized in designing the plant. The aggregate is heated by high pressure steam that enters the bins through twenty-four ½-in. steam pipe jets with flattened ends (1). The 800-gal. water tank (4) is heated by means of an open end 1-in. steam pipe (3), with valves and pet cocks located so as to give complete drainage. Full steam pressure is developed from a cold start within two minutes, and is supplied by a Littleford Tank Car Heater (5) containing a Vapor steam generator that develops over 1000 lb. of steam per hr. at pressures of from 50 to 300 p.s.i. The steam generator is fired by diesel fuel. Numbers, herewith, are identified in the photograph.

Mixing operations with heated aggregate get underway in about 60 min. from a cold start at 15 deg. F above zero. The company has mixed over 100 cu. yd. of concrete with heated aggregate in several 8-hr. winter days.

During the day, after the bins and water tank have been heated, and when there is a lag between trucks, the steam generator cycles on and off automatically as needed. At the end of the day it takes approximately five min. to blow the coils and drain the generator. High pressure steam also is used to clean the company trucks daily, and to thaw out railroad hopper cars that may have frozen enroute.

Liner for Concrete Mixer

THE GOODYEAR TIRE & RUBBER CO., INC., Los Angeles, Calif., announces an abrasion resistant liner for concrete mixers, known as the Goodyear Plioweld Rubber Liner, which may be vulcanized in place either on the mixer shell itself or on a separate light gauge steel liner.

The company reports that one of these liners was installed in a two-sack paddle-type mixer at the Keogh Bros. Concrete Products Co., Glendale, Calif., and already has been in service 50 percent longer than the best previous steel liner, yet shows no sign of wear.

NEW MACHINERY

Reusable Horizontal Shoring

BESSER MANUFACTURING CO., Alpena, Mich., recently announced the Acrow floor center, an extendible metal shoring device for laying concrete block floors or roofs. Advantages claimed for the new telescopic floor center are that it eliminates all timber shoring, allows clear space under floor during construction, reduces labor costs and makes soffit tile more saleable.

The device consists of a steel beam with extensions on each end that are set by a ratchet and key system to fit across the span the floor is to cover, resting on the building walls. In cases where the span is too wide for a single center, they are placed end to end with an I beam support in the center. The company also manufactures a beam holding device that raises the telescopic center to the proper height.

Non-agitating type of pre-mixed concrete delivery body

Placing a flat roof on a 30-ft. store building with soffit block laid on the new-type telescopic steel floor center. Seven days after concrete was poured in the rib joists, centers were removed. In this job two centers were used, end to end, supported in the center by an I beam

Concrete Delivery Body

HERCULES STEEL PRODUCTS CORP., Galion, Ohio, announces an improved body for hauling air-entrained concrete, called the "Aircreter." The unit is manufactured in two sizes: Junior, hauling 2-2½ cu. yd. of concrete, and Senior, hauling 3-4½ cu. yd. of concrete. According to the manufacturer, the Aircreter incorporates many new improvements including full radii discharge operation, new high pressure radii gate, controlled-discharge angle indicator, finger tip throttle control, insulated body and the recently perfected rollaway chute. In addition the unit employs the "Hercules Secret," a principle of pressuring concrete off the bottom first. It is claimed that this system assures a consistent pour.

Lift Truck Spots Cubes

SERVICE CASTER & TRUCK CORP., Albion, Mich., manufactures the Service MoTowLift truck, equipped with "air-expanding" forks. According to the manufacturer, no pallets or "base" layers are needed to handle block when using the MoTowLift; air-expanding forks handle heavy cubed loads easily, lessening breakage and chipping. Tests have shown that an operator can load a truck with four cubes of block in 5 min., and a large trailer with 12 or 15 cubes in 20-25 min. A side-shifter moves the load laterally, enabling an operator to spot a cube tight against the others without jockeying. Ford-powered, the lift truck has a capacity of 4000 lb. on a 24-in. load center.

Lift truck requiring no pallets

GUAGE READING IN TONS	PRESSURE IN POUNDS PER SQ. IN.		
	Hollow-Load Bearing Units		Bricks
	8" X 16" 120 Sq. In.	12" x 16" 182 Sq. In.	3 3/4" X 8" 30 Sq. In.
27	450	296	1800
30	500	329	2000
33	550	362	2200
36	600	395	2400
39	650	428	2600
42	700	461	2800
45	750	494	3000
48	800	527	3200
51	850	560	3400
54	900	593	3600
57	950	626	3800
60	1000	660	4000
63	1050	693	4200
66	1100	726	4400
69	1150	759	4600
72	1200	792	4800
75	1250	825	5000
78	1300	858	5200
81	1350	891	5400
84	1400	924	5600
87	1450	957	5800
90	1500	990	6000
93	1550	1023	6200
96	1600	1056	6400
99	1650	1089	6600
102	1700	1122	6800
105	1750	1155	7000
108	1800	1188	7200
111	1850	1221	7400
114	1900	1254	7600
117	1950	1287	7800
120	2000	1320	8000
123	2050	1353	8200
126	2100	1386	8400

Grade B — Grade A — Grade B — Grade A — Grade B — Grade A

Grade A units are for exterior walls below grade and for unprotected walls above grade.

Grade B units are for general use above grade where protected from the weather by satisfactory waterproofing treatment. Grade B units may be used for backup work.

Blocks testing in red areas should be considered scrap.

Some localities have various testing standards which may deviate slightly. However, these can be considered as fairly standard, and are being used in most places.

CARE OF MACHINE

This machine, as any other, should be cleaned regularly.

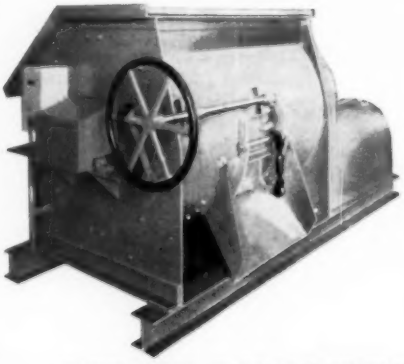
Wipe precision ground pressure plates with turpentine after each test.

Check quantity of hydraulic fluid occasionally

If your machine does not operate properly, call or write

THE YODER CO.
5500 Walworth Ave.
Cleveland 2, Ohio
Phone Melrose 0520

Quality Mixer for Modern Demands



The
KELLEY "30 D"
30 Cubic Foot
MIXER

- Paddle Blade Type
- Direct Driven via 15 HP syncrogear motor
- Available in Clutch Pulley Gas or Diesel Engine Drive
- Kelley "20T" Mixer 20 Cu. Ft. Capacity

ADDITIONAL KELLEY EQUIPMENT

- KELLEY Power Stripper Block Machines
- Automatic Block Snatcher and Stacker
- Skip Loaders and Bucket Elevators
- Crushers • Compressors • Bins • Screens
- Pallets • Racks • Lift Trucks • Complete Line
- Anchor Stripper and Tamper Parts

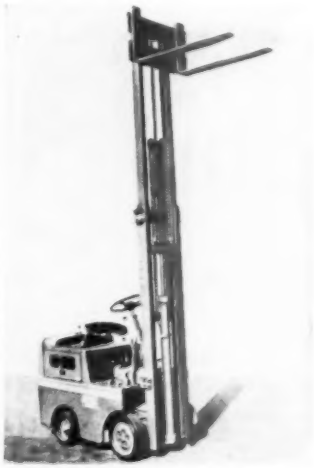
WITTEMANN MACHINERY CO.
MFRS.
(Successors to E. B. Kelley Co.)
Farmingdale Phone 5-6791 New Jersey

Block Testing Machine

THE GENE OLSON CORP., Adrian, Mich., announces its "Gocorp-Yoder" testing machine for daily testing of concrete block. Weighing approximately 2600 lb., the machine tests units of 16- and 18-in. size, giving pressure readings to 250,000 lb. It also tests concrete cylinders, 6- x 12-in., up to 9000 p.s.i.

High Lift Attachment

CLARK EQUIPMENT CO., Battle Creek, Mich., has announced that the Hi-Lo-Stack, a patented high-lift low-clearance device, has been adapted to the Clark Clipper models, both gas-powered and electric battery-powered machines of 2000-lb. capacity. The unit, mounted on a Clipper, permits an overall collapsed height of 83 in., a maximum lift of 130 in., and a free lift of 64 in. without increasing the overall height of the machine. The improved Hi-Lo-Stack features a single hydraulic lift-cylinder and single set of uprights, and a balanced hydraulic system for lift operation.



High lift device has maximum lift of 130 in.

Photelectric Control for Industrial Application

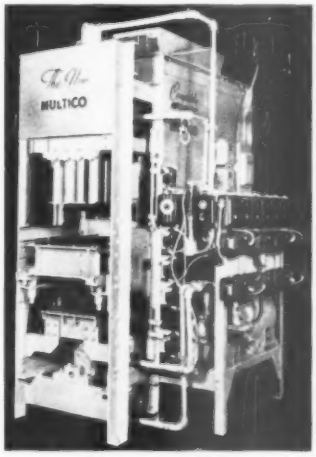
PHOTOSWITCH, INC., Cambridge, Mass., announces the Type 20DJ1 Photelectric Control for general industrial and machinery application. The phototube, which must be located where the operations are to be controlled, is available either integral with the housing or in a small separate housing as shown in the photograph. A tamper-proof sensitivity adjustment on the control permits positive operation over varying distances between

Photoelectric control

phototube and light source and under all conditions of ambient light, according to the manufacturer. Other features are hermetically-sealed, oil-filled condensers, and high wattage resistors.

Automatic Block Machine

MULTIPLEX MACHINERY CORP., Elmore, Ohio, has developed a new Multico concrete block machine which is said to provide completely automatic operation, with hydraulic power for strike-off, pallet feeder, and the block pressing mechanism. The unit is made in two sizes to produce either three block at a time up to 5760 per 8-hr. day, or two block at a time up to 3840 per 8-hr. day.



Automatic block machine

Either plain or cored pallets can be fed automatically and any aggregate can be used, according to the manufacturer. The mix is fed into the mold box, vibrated for compactness, and pressed under regulated hydraulic pressure to form a smooth top and give uniform density.

Brown Concrete Tile

THE CONCRETE PRODUCTS & ROOFING CO., Birmingham, Ala., is furnishing rough texture brown English tile for an apartment project in that city.

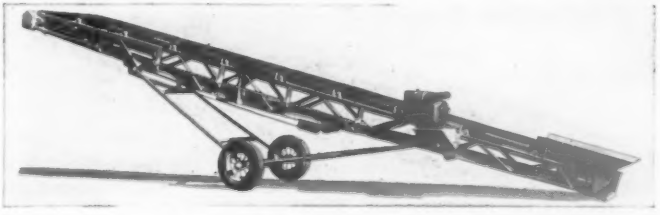
DESIGNED BY Baughman

FOR MAXIMUM PRODUCTION

Here is a quarry keyed to maximum efficiency through the use of Baughman HI-SPEED Conveying Equipment. Practical, experienced engineering—proven in operation — that will increase your output. Baughman's standardized production methods cut your equipment costs. Quality materials and skilled craftsmanship minimize maintenance expense. Baughman HI-SPEED Equipment is designed to meet your particular requirements. Special equipment built to order. Learn how Baughman can help you. Write, wire or phone for complete information.

Pictured Below: MODEL No. 164 TROUGH BELT CONVEYOR

Pictured at Right: MODEL No. 175 STANDARD MEDIUM-DUTY BELT AND BUCKET CONVEYOR



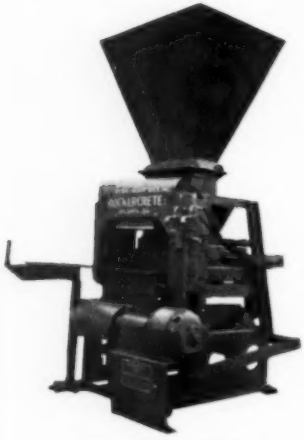
If It's HI-SPEED . . . It's BAUGHMAN

manufactured by

BAUGHMAN MANUFACTURING CO., Inc.

959 ARCH STREET JERSEYVILLE, ILLINOIS

Good News for the small producer



QUALITY ASSURED
Rockercrete machines are licensed under Gelbman Basic Patents for vibration under pressure.

Immediate Delivery on

the famous ROCKERCRETE Block Machine
. . . cored to your pallets
. . . free supervision of installation
. . . and a liberal trade in on your old equipment

Produce top quality, even density, fully-pressed-top block *equal to any* on the market regardless of type of production unit employed — every time — with any aggregate — at rate of 1500-2000 per day.

This leader in the medium production field is semi-automatic in operation, has fingertip control and vibrates block under pressure. Rigid construction means low maintenance expense.

You can meet all competition with quality of product — high delivery rate — low operating expense.

Investigate This Opportunity TODAY!

ROY DARDEN INDUSTRIES Inc.

P.O. Box 95, Northside Branch
ATLANTA GEORGIA

UNIT...tops them all!

For sheer ruggedness, speed and all-around dependability, you just can't beat a UNIT Excavator. UNIT is nimble, sturdy, fast . . . Famous UNIT one-piece cast case provides perfect alignment of all working parts. Other exclusive UNIT features include: Automatic traction brakes . . . Straight line engine mounting . . . Drop forged alloy steel gears . . . Splined shafts . . . Disc type clutches. Convertible.

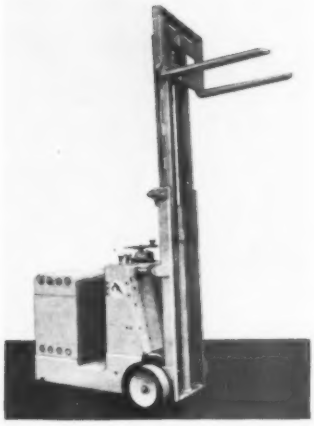
½ and ¾ YD. EXCAVATORS
CRANES UP TO 15 TONS

New FULL VISION Cab provides maximum visibility. Operator can see in ALL directions. Promotes safety. Increases efficiency.

You can tell it's a UNIT by the FULL VISION CAB. There's no other cab like it.

UNIT CRANE & SHOVEL CORP.

6431 W. BURNHAM ST., MILWAUKEE 14, WIS., U. S. A.



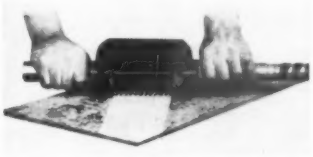
Electric fork truck of 1500-lb. capacity

Electric Fork Truck With 1500-lb. Capacity

LEWIS-SHEPARD PRODUCTS INC., Watertown, Mass., has announced the addition of a 1500 lb. capacity electric unit to the company's "Master" line of "Standrive" power fork trucks. The new unit carries a full 48-in. long capacity load, and is available in both telescopic and non-telescopic models. The telescopic type, with collapsed height of 83 in., has a lifting height of 129 in. Other features listed by the manufacturer are a low center of gravity, pivot point steering, and "deadman" type brakes which are released by depressing the brake pedal.

Pallet Cleaning Machine

ELLIOTT MANUFACTURING CO., Binghampton, N. Y., has developed a flexible shaft machine with an attachment for cleaning steel pallets used in block machines. The unit will clean a badly cement-caked pallet 18- x 26-in. (approximately) in less than one minute without using acid or any other cleaning agent, according to the company. The chipping head has four rows of star wheels driven by a flexible shaft attached to a 3450 r.p.m. motor.

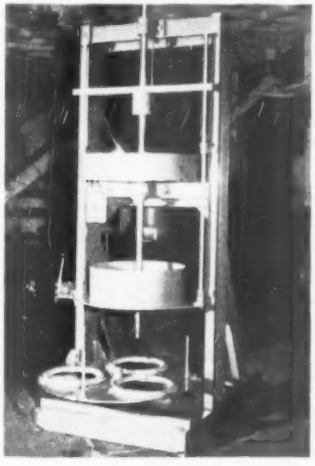


Close-up of chipping head on pallet cleaning machine. Unit operates like rolling pin

The star wheels have center holes larger than the rods that support them, and when revolving at high speed set up the abrasive and impact action. Inboard and outboard handpieces provide grips for even pressure distribution. The unit, which operates like a rolling pin, cleans a 4-in. path as it travels. Another feature listed by the company is that by unthreading the chipping head, the operator has a complete standard flexible shaft machine suitable for use with grinding wheels, wire brushes, etc.

Rubber Tubing Molds Ducts in Concrete

DUCTUBE CO., Washington, D. C., has developed a pneumatic rubber tubing, Ductube, for molding ducts in concrete and other mastics. The tubing is said to be ideal for molding smoothbore ducts of uniform diameter in floors, walls, columns, beams or slabs. The ducts may be molded either straight or curved and may be used for power, light, and telephone lines, in addition to drains, grout holes, air radiant heating, and cooling purposes. By molding a series of holes in concrete slabs, lightweight wall panels can be produced, according to the manufacturer, such panels weighing 40 percent lighter than standard panels. Ductube is available in standard lengths or 12, 20, 30 and 40 ft. and in standard sizes for molding ducts of 1, $1\frac{1}{2}$, 2 or 3 in. in diameter, and may be re-used indefinitely.



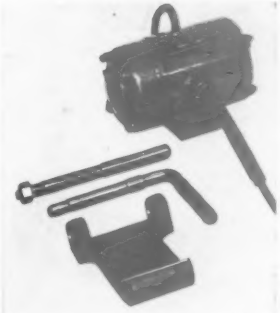
Tile machine

Tile Machine

ST. JOHNS TOOL AND DIE CO., St. Johns, Mich., is manufacturing the Parker-Banks Tile-Master for the production of 4- to 12-in. concrete drainage and irrigation tile. Features listed by the manufacturer are rugged construction throughout; tapered Timken roller bearings and dustproof housings for long service; high tensile strength;

(Continued on following page)

PRECISION VIBRATION WITH THE TOPDOG FORM VIBRATOR



Let us help you solve your problem in vibration. Write us for specific information as to your particular problem.

TOP DOG form vibrators available for 110 or 220 volt 3-phase, 60 cycle A.C.

FREE BOOKLET

Write for technical booklet giving information of profitable interest to everyone associated with concrete construction.

VIBRO-PLUS CORPORATION

243 West 55th St., N.Y.C.

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A FEW CHOICE TERRITORIES OPEN FOR DISTRIBUTORS

"ANCHOR"

Complete

EQUIPMENT AND ENGINEERING SERVICE

Equipment for all phases of manufacturing concrete cinder block and other lightweight aggregate units. Our engineering service for new plants and modernizing old ones will help you operate more economically.

Stearns Clipper Stripper Machines; Stearns Jolterete Machines; Stearns Mixers; Cast Iron and Press Steel pallets. Straublex Oscillating Attachments, etc.

Repair parts for: Anchor, Stearns, Blystone Mixers and many others.

Anchor Concrete Mchy. Co.

1191 Fairview Ave., Columbus 12, Ohio

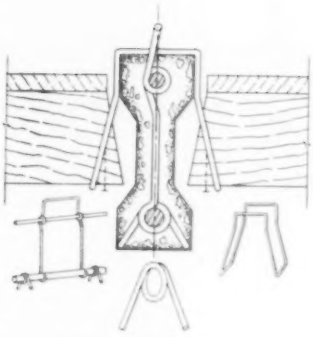
turned and ground spindle shaft for long life; direct V-belt spindle drive; no gears; adjustable traverse speed of packer head lift; choice of hydraulic or compressed air packer head lift; and flywheel type V-pulley on spindle for extra power. The unit has "all-steel" construction and adjustable toggle clamps.

Side-Shifting Attachment for Fork Trucks

LEWIS-SHEPARD PRODUCTS, INC., Watertown, Mass., has developed a side shifting attachment for the carriage of the company line of power fork trucks. Shifting of forks is controlled by a hydraulically operated "deadman" type lever located on the operator's cab. According to the manufacturer, the forks can be shifted and held by as much as 4 in. to the right or left of center position. The moveable portion of the carriage is mounted on 12 hardened alloy steel roller bearings to take horizontal and vertical thrusts to reduce friction.

Centered Stirrup

AUTOMATIC SPRING COILING CO., Chicago, Ill., is in production of a centered stirrup in cooperation with the Portland Cement Association. In T-beams, the top bar usually is ⅝ in. center line and small enough so that the offset produced by an old style



Details of redesigned stirrup

stirrup will not be serious as far as fire protection is concerned, the manufacturer states. In independent beams, the top bar is larger than used in the T-beam joists and the offset produced by the old type stirrup brought the top bar too close to the surface of the joist to have sufficient coverage for fire protection. Using the old type stirrup and keeping the top bar on the center line of the joist would bring the vertical portion of the stirrup too close to the joist surface, and the projecting portion would not be on the center line of the joists making the placing of precast

Different... Sensational... **WORK THE FIRST DAY AND THEREAFTER**

$4300.00! HOW CAN SO LITTLE MONEY BUY SO MUCH! **400** **BLOCKS PER HOUR**

VAN-U-MATIC BLOCKMAKER

VAN-U-MATIC has ALL the features . . . Pneumatic power operation, vibration and off-bearer . . . Plain pallets (⅓ usual pallet investment) . . . Makes all size blocks, 16″ or 18″ length . . . Quick, easy changeover . . . True dimensional, Perfect blocks . . . Compact, easy to install and clean . . . We can finance.

Van Ornum Co. **Westmont, N. J.**

344 Haddon Ave., Phone COllingswood 5-4767

DEMONSTRATION PLANTS AND REPRESENTATIVES

Tobin Bros. Florence, Mass.
John Haeussler Con. Prod. Buffalo, N. Y.
G. W. Robertson Hillsdale, N. Y.
Wonder Con. Prod. Newton, N. J.
F. H. Yonks Chester, Pa.
Gerald Associates, Inc. Union City, Mich.
Van-U-Matic Sales Co. Woodbridge, N. J.
Northeast Con. Prod. Northeast, Md.
Maysville Con. Prod. Maysville, Ky.

floor slabs difficult. The engineer would not know where the top bar was with respect to the center line of the joist. The new type of stirrup is said to center the top bar for both the T-beam and the independent beam and thus provide maximum fire protection for the steel. A reverse kink below the top bar keeps the vertical portion of the stirrup on the center line of the joist and also provides this portion with maximum fire coverage. The top projection portion of the stirrup also has been bent so as to keep this part on approximately the center line of the joist thus providing the engineer with a quick check as to how accurate the top bar was placed with respect to the center line of the joist. This portion also was bent to the center line so as not to interfere with placing of precast floor slabs.

Gasoline Lift Truck

YALE & TOWNE MANUFACTURING CO., Philadelphia Division, Philadelphia, Penn., has started the manufacture of gasoline-powered industrial trucks to supplement its line of electric trucks. The new line, to be known as

Lift truck with 83-in. collapsed height, 66-in. free lift and 130-in. maximum height

the "Lift King" gas truck line, will feature fluid drive, automotive controls, hydraulic piston lift (in two stages by means of a ram-within-a-ram), and low-mast heights with high free lifts.

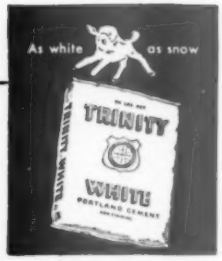
KENTUCKY CONCRETE PIPE CO., Louisville, Ky., is constructing a new plant and installing new equipment for automatic handling of materials.

HUMBOLT CEMENT BLOCK CO., owned and operated by Nick Albus and Lester Naeve, has added steam curing facilities.

DON HELLER has purchased the interest of Joseph Micklitsch in the Bluffton Ready Mix Concrete Co., Bluffton, Ind.

Trinity White

the whitest white cement!



Trinity White is a true portland cement made from selected raw materials. It has all the excellent portland cement qualities of strength, endurance and workability. Use Trinity by itself for whiteness—with pigments for purer, truer color values. Use it in architectural concrete units, terrazzo, stucco. Trinity White Portland Cement — plain or waterproofed. Trinity Division, General Portland Cement Co., 111 W. Monroe St., Chicago; Republic Bank Bldg., Dallas; 816 W. 5th St., Los Angeles.

TRINITY WHITE
PORTLAND CEMENT

AN AD . . . Written in its essential facts, by an Enthusiastic Owner of the KENT STEDIFLO MIXER

WM. MOORE CONCRETE PRODUCTS
CINDER AND CEMENT BLOCKS

SEP 1 - 1948

September 30, 1948

KENT MACHINE CO.
The Kent Machine Company
Cuyahoga Falls, Ohio

Attn Postal Check

Gentlemen:

You probably would be interested to our experience with your Stediflo continuous mixer as it has been in operation approximately one and one-half years.

The mixer is handling 150 cubic yards of cinder concrete per day on an exceptionally low maintenance cost. While satisfactory in our cinders are entirely of lower cut have a high abrasive factor. In addition to low operating costs we find state that we have not lost any time due to mechanical failure of the Stediflo continuous mixer.

The method of proportioning cement and cinders by weight, some cut by daily checks of plant and strength, site of flow tubes - negligible cement ... by over-time delays.

... produces (one) 8 cu. ft. per hour and on ... and final) of solids per hour without ... next circuit. We believe the ... produce concrete to keep up with ... one (1000) 8" per hour.

... satisfied with the performance of the ... yield, strength and texture of cinder block ... and dog out, along with a savings in power ...

Very truly yours,

WM. MOORE CONCRETE PRODUCTS

Hubert Moore

Hubert Moore

After one and a half years of service Hubert Moors writes:

"Handling 150 cubic yards of concrete per day — particularly satisfactory as cinders are highly abrasive — low operating costs — no time lost due to mechanical failures — proportioning accurate as shown by periodical checks of yield and strength — believe Stediflo can keep up with machine producing in excess of 1,000 8 inch blocks per hour — yield, strength and texture constant along with saving in power and labor — completely satisfied."

SOON TO BE ANNOUNCED are smaller continuous mixers embodying Stediflo principles, making the many advantages and economies available to plants of all sizes. Register your name for information.

The KENT MACHINE CO. Cuyahoga Falls, Ohio

Manufacturers of CONCRETE PRODUCTS MACHINERY Since 1925

With LITH-I-BLOCK

And ONLY Lith-i-Block

You Get All Three

① Lower Production Cost
② Maximum Production
③ Higher Quality Product

When your present block manufacturing equipment doesn't begin to meet the production records experienced by the Edward Campbell Co., of Vineland, New Jersey, it's time to do some investigating. If you decide to buy a new machine be sure you buy all three production factors wrapped up in one machine—the Lith-I-Block Machine. When you can make actual labor costs come as close to 1c per block as the Edward Campbell Co. is doing day-in and day-out, you're assured of maximum profits on your investment. Only a postcard will bring you all the facts about that block making marvel of the 20th century.

LITH-I-BAR CO. Dept. CP-5 HOLLAND, MICHIGAN

LITH-I-BLOCK Machine

U.S. & Foreign Pats. Pending — Trade Name Registered

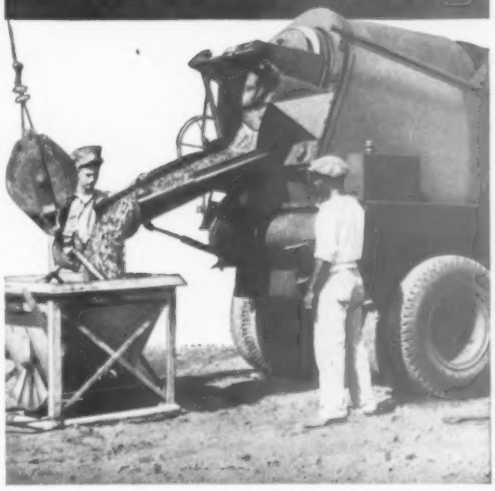
BLYSTONE MIXERS

BACKED by more than 35 years of specialized experience, BLYSTONE Mixers offer five basic advantages for a wide variety of concrete work: 1—*Low Initial Cost;* 2—*Low Mix Cost;* 3—*Thorough Mix;* 4—*Easy Operation;* and 5—*Sturdy Construction.*

Write for complete details.

BLYSTONE DIVISION
STANDARD SAND AND MACHINE CO.
549 W. Washington Boulevard • Chicago 6, Illinois

JAEGERS give you business advantages



In the producing end of your ready-mix business, Jaeger truck mixers alone give you the complete choice of sealed top-loading drums or end loaders, whichever fits your operation most efficiently. With either type you gain the advantage of a faster charging and discharge cycle, high daily payload average, and consistently low maintenance.

In selling, you benefit by the recognized higher strength of Jaeger dual-mixed concrete, accurately controlled for slump and free from segregation over any length of haul.

only Jaeger "Speed Merchants" give you:

- Two-speed mixing
- Positive fast water distribution with clog-proof jet
- Center drum drive in positive lifetime alignment
- Engine and water system fully enclosed from weather
- Dual-mixing action
- Sealed top loaders, best for wet-mix and most plants that ribbon-load at one point
- End-loaders for multi-point loading or very bulky material

Sizes from 2-3 to 5½-7½ yd. Ask for Catalog TM-8.

THE JAEGER MACHINE CO., Columbus 16, Ohio

Sales, Rentals, Service in 130 Cities of the United States and Canada

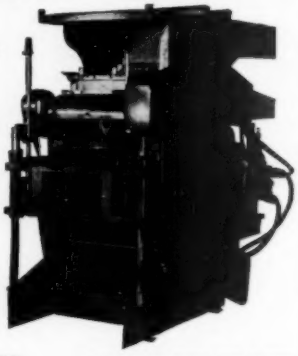
PORTABLE AND STATIONARY COMPRESSORS • PUMPS • 2-SPEED HOISTS

FLEMING
THE OF ST. LOUIS

FMC 180

THE QUALITY NAME IN CONCRETE PRODUCTS PLANT EQUIPMENT

Automatic Concrete Block Machine



CUSTOMERS SAY —

"I still say you should call it the 225 as it turns out that many per hour, day in and day out."
Kingsport, Tennessee

"While you rate them at 180 per hour, we are presently running both machines at a rate of 240 blocks per hour on each. Our total labor cost in the kiln is 1½ cents per block."
Wichita, Kansas

"The timing is positive and not regulated by the operator. But, best of all, the machine is well made."
Independence, Missouri

THE PLAIN PALLET VIBRATOR AT LOW COST!

COMPLETE BLOCK PLANTS ENGINEERED TO YOUR REQUIREMENTS

FLEMING MANUFACTURING CO. INC.
COMPLETE CONCRETE BLOCK PLANT EQUIPMENT

4987 FYLER AVE. - - - ST. LOUIS 9, MO.

8 TONS with an Erickson

NO PAVED RUNWAYS NECESSARY

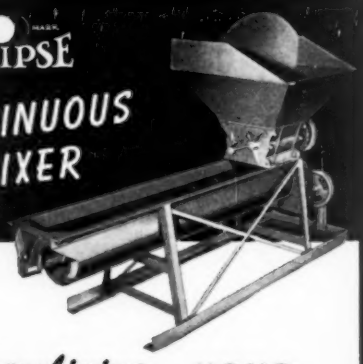
Handles up to 84" Concrete Pipe

This "Super-Special" Erickson Power Lift Truck for handling extra heavy loads has a HYDRAULIC BOOSTER for easy steering. Perfect traction is assured by DUAL WHEELS all around with large pneumatic special tread tires . . . Special high tilting mast with boom attachment handles all sizes pipe up to 84" diameter. Multiple forks can be used to handle smaller pipe. All Erickson Fork and Platform trucks are individually built to meet *your* operating requirements. Tell us the job to be done—*write for literature.*

Erickson POWER LIFT TRUCKS, Inc.
1405 Marshall Street N. E. • Minneapolis 13, Minnesota

TRADE ECLIPSE MARK

CONTINUOUS MIXER



Streamlining YOUR CONCRETE BLOCK MANUFACTURING

More production and larger profits are yours when you install the Eclipse Continuous Mixer. This mixer is the ideal companion to the Eclipse Concrete Block Machine and the Eclipse Power Tamper. Easily loaded, quick uniform mixing, positive geared discharge. The paddles are attached to a square shaft assuring positive, trouble free operation. Paddle shaft easily removed for cleaning. Well constructed for longer life.

WRITE OR WIRE FOR FURTHER INFORMATION

MANUFACTURED BY
GEO. C. CHRISTOPHER & SON IRON WORKS
FOR FORTY YEARS THE WORLD'S BEST IN CONCRETE MACHINES
P. O. BOX 610 WICHITA, KANSAS

Color in Concrete

The easily dispersible, non-floating, permanent, qualities of these extra strong colors produce intense shades in concrete.

Special blends in ton lots at no additional charge. Working samples furnished.

629 W. Washington Blvd.
Chicago, Illinois

1261 Broadway
New York, 1 N. Y.

MINERAL PIGMENTS CORP., MUIRKIRK, MD.

CONCRETE BURIAL VAULTS

AMERICA'S FINEST MOLDS AND LOWERING DEVICES

BERG VAULT SYSTEM

TERRITORY FRANCHISES

BERG VAULT CO.

EQUIPMENT DIVISION
1620 LUCAS HUNT RD. ST. LOUIS 21

CLASSIFIED ADVERTISING

READY-MIXED CONCRETE AND CONCRETE PRODUCTS EQUIPMENT

Single insertion rate $10.00 a column inch. Larger insertions at lower rates; request Concrete Products Classified rate card. POSITIONS WANTED and POSITIONS VACANT (not display ads) $1.00 a column inch an insertion. Terms: Cash with order except contract advertisers who are billed monthly.

FOR SALE

FOR SALE

One Johnson 600 cubic yard cap., 9 compartments; 96 ft. Hex shaped mounted on 14" H-Beam, 67 ft. long; Batching Equipment, Water Batcher; Collectors, two, 2 yard Smith Mixer, Cement Elevator, about 300 ft. 24" Sand Conveyor with under truck feed conveyor; Hot water equipment, Air compressors, Heating Plant, Office Equipment. A plant built about two years ago and on account of its location was condemned and only was in operation about a month. Sold on Court Order. The plant is complete and is for sale at less than one half of the cost. If you are contemplating building a ready mix plant it will pay you well to come and see this before buying.

HASS WHOLESALE, INC.
3922 W. Sample St., South Bend 21, Ind.
Telephone—3-9407

FOR SALE

Twin tamper concrete pipe machine with 18 cu. ft. mixer, hopper and bucket elevator, feeder box, all motors, switches and controls; also Quinn tongue and groove jackets, cores, and pallets 30" through 60" all in first class condition.

CONCRETE PIPE PRODUCTS CO.
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FOR SALE

Crushed and sized cinder aggregate, tested and approved for the manufacture of cinder blocks. Write:

DULUTH CINDER SLAG & STONE CO.
Box 274 Duluth, Minn.

FOR SALE

All in perfect condition. Replaced by heavier equipment. Barrett-Cravens Electric Platform Truck with extra batteries and charger, complete $500.00. Erickson Fork Lift Truck with Pneumatic tires, $1000.00
Clark Fork Lift Truck with Dual Pneumatic tires, $2000.00

RENNEKAMP SUPPLY CO.
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STEARNS OFF-BEARER HOIST—NEVER USED. PURCHASED NEW $1800.00—WILL SELL $1200.00

THOMAS CONCRETE PIPE CO.
Oklahoma City, Oklahoma

FOR SALE

2—single worm Telsmith sand screws
1—6x6 Diamond T Truck with 8 yd. Dump box and winch.

FRED RADANDT SONS
Manitowoc, Wis.

SALE

Used 28 Cu. Ft. Mixer. Sturdy Well-built. Fabricated at our own plant. Less Motor $750.00

D & R CORPORATION
45 Skiff Street Hamden, Conn.

FOR SALE

PACKERHEAD PIPE MACHINES. Two Dixons make 4" to 10" pipe. One McCracken makes 4" to 24" pipe. All with or without equipment.

UNIVERSAL CONCRETE MACHINERY CO.
297 S. High St. Columbus, Ohio

FOR SALE

1—Monroe Hydraulic Block Machine—Condition perfect with 12 cu. ft. Mixer and conveyor. Ample spare parts making room for larger capacity equipment. Can be seen in operation.

CARY CONCRETE & PLASTICS PRODUCTS CO.
U.S. No. 14 Cary, Ill.

Marion Electric Shovel
1¾ Yard
Model No. 37
Serial No. 5626
All new wiring
Machine in good working condition

CONCRETE MATERIALS & CONSTRUCTION COMPANY
405 Granby Bldg. Cedar Rapids, Iowa
Tel. 3-0233

FOR SALE

1—Dunbrik Production Mach. complete with pallets 40-3 cars for 12,000 bricks per day, with lift jack.
1—Dunn Champion Drain Tile Mach. with heads from 4" to 8".
1—2 Bag cement mixer.
This equipment has been used one year will take 60% of new cost.

DUNBRIK MFG. CO.
531 Schmidt Rd. Davenport, Iowa

FOR SALE

1—Multiplex Super Tamper—Semi-Automatic—used 6 mos.
1—C.C. 14 cu. ft. mixer—New Liners, Bearing just installed Motors included—Price $2,000.00 cash.

GRANDVIEW GRAVEL BLOCK CO.
1705 Hamburg St., Schenectady, N. Y.

FOR SALE

Completely Equipped demonstration Block Plant ready for shipment. Includes: Block Machine, Mixer, Conveyor, Hopper, Offbearer, pallets, racks, hydraulic lift truck, 4", 8", and 12" Molds. Vibrikcrete brick machine with chimney block and slab attachments and pallets. A completely motorized plant with starters. Priced for quick sale.

R. S. REED CORP. Three Rivers, Mich.

FOR SALE

2 No. 7 Stearns Joltcrete block machines complete with 8 inch and 4 inch mold box, also press steel pallets. All in No. 1 condition.

TRIECE'S CONCRETE PLANT
Kannapolis, N. C.

FOR SALE
CONCRETE PRODUCTS PLANT EQUIPMENT

1—Stearns 18 cu. ft. mixer complete with 10 H.P. motor
1—Model A. Clipper Stripper all power operated block machine
1500—8" aluminum pallets
1500—12" cast iron pallets
3000—4" cast iron pallets
1—8" mold box
1—12" mold box
1—4" mold box
1—Brick attachment—new
25—block racks—50 block capacity
1—30 H.P. boiler
1—Barret Cravins electric lift truck with charger
2—Multiplex flue block machines—16x16 used, 16x20 new—150 pallets each
1—24" well curb form
1—18" well curb form
1—10" well curb form 1—6" well curb form
1—bucket elevator complete with belt and motor
This equipment is less than two years old.

BLACK HILLS CONCRETE PRODUCTS COMPANY
Rapid City, S. D.

USED BLOCK MACHINES FREE

(With Attachments and Motors)

1 STEARNS Model "A" Clipper.
1 STEARNS Joltcrete No. 9
1 BESSER K-3 Semi-Automatic
1 BROWN Vibrator Block Machine
1 VI-BRIK-CRETE Brick Machine
1 GRAVELEY Vibrator Block Machine

All Block Machines are given FREE to anybody buying all the pallets.

Anything that you want for your products plant I probably have it or I can get it for you at the very lowest cash prices.

WILLIAM M. CHASE
(Dealer)
15 Linwood Avenue
Buffalo 2, N. Y.

$15,000 Block Plant—capacity 6000 8x8x16 blocks per day.
1—FC George 2 unit super vibrator block machine.
2—Rob Graveley 2 unit Super vibrator twin block machines. 7,000 all sizes partition and regular block pallets. Now in operation complete with 1 and 2 bag mixers, motors, hoppers, conveyors and all accessories—a complete plant. Other business interest reason for selling. No reasonable offer refused.

DR. A. B. CRANE
P.O. Box 208 Phone 147 or 371 Pascagoula, Miss.

HAVE YOU SEEN OUR NEW PALLET CLEANER?

AN AUTOMATIC MACHINE FOR REMOVING CONCRETE "BUILD-UP" FROM PLAIN PALLETS. Cleans an 18½x26" Pallet in 12 seconds.
Write for Free Literature

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189 Franklin Ave., Nutley 10, N. J.

ALSO SEE CLASSIFIED ADVERTISING ON OTHER EQUIPMENT IN ROCK PRODUCTS' GENERAL SECTION

MARTIN PACKERHEAD PIPE MFG. EQUIPMENT

We have the following equipment to sell: This equipment has never been used and will be sold at approximately one-half list price.

Quan.	Description
5—	24" Bell End Jackets
1—	Top Filler Plate
1—	Top Jacket Holder
1—	Push Ring
97—	Wings
397—	Trowlers
1—	Spider
6—	Castings
2—	Bottom Jacket Holders
4—	Flat Bushing Rimmer
1—	Bell End Ring
5—	21" Bell End Jackets
1—	Top Filler Plate
1—	Top Jacket Holder
1—	Push Ring
	Wing, same as 24"
	Trowler, same as 24"
1—	Spider
6—	Castings
1—	Bottom Jacket Holder
4—	Flat Bushing Rimmer
1—	Bell End Ring
5—	18" Bell End Jackets
1—	Top Filler Plate
1—	Top Jacket Holder
1—	18" Push Ring
1—	Wing
2—	Bottom Jacket Holder
4—	Flat Bushing Rimmer
1—	Bell End Ring
5—	15" Bell End Jackets
1—	Top Filler Plate
1—	Top Jacket Holder
1—	Push Ring
46—	Wing
127—	Trowler
1—	Spider
5—	Casting
2—	Bottom Jacket Holder
4—	Flat Bushing Rimmer
1—	Bell End Ring
5—	12" Bell End Jacket
1—	Top Filler Plate
1—	Push Ring
4—	Flat Bushing Rimmer
1—	Bell End Ring
5—	10" Jacket
1—	Top Filler Plate
1—	Push Ring
38—	Wing
3—	Trowler
10—	Castings
1—	Bottom Jacket Holder
5—	Flat Bushing Rimmer
1—	Bell End Ring
4—	9" Jacket
1—	Top Filler Plate
1—	Top Jacket Holder
1—	Push Ring
51—	Wing
211—	Trowler
1—	Spider
6—	Castings
2—	Bottom Jacket Holder
4—	Flat Bushing Rimmer
1—	Bell End Rings
5—	8" Jackets
1—	Push Ring
	Wing, same as 9"
	Trowler, same as 9"
2—	Spiders
2—	Bottom Jacket Holder
5—	8" Flat Bushing Rimmer
1—	Bell End Ring
4—	6" Jacket
1—	Top Filler Plate
1—	Top Jacket Holder
1—	Push Ring
167—	Wing
273—	Trowler
1—	Spider
5—	Castings
1—	Bottom Jacket Holder
4—	Flat Bushing Rimmer
1—	Bell End Ring

Contact H. L. Daniel c/o Pollard Bros., Ltd., Rt. 4, Box 144, Fresno, Calif.

FOR SALE

IMMEDIATE DELIVERY

1—Besser Super-Vibrapac Block Machine

1—Standard Offbearing Hoist

90—Block Racks—(72 Blocks)

2000—Pallets

Plus the following attachments; 1 brick; 1 header block; 1 four inch; 1 six inch; 1 eight inch; 1 ten inch; 1 twelve inch; and fractional attachments for 8, 10 and 12 inch; also 10 inch return corner.

This machine has been installed about twenty months and only slightly used, (total production 500,000 blocks). All parts in excellent condition.

Box H-57, Concrete Products, 309 W. Jackson Blvd., Chicago 6, Ill.

PRACTICALLY NEW QUINN CONCRETE PIPE MACHINE

12" to 60" Jackets, Rings, Pallets, Carts, etc. 12" to 60" Inclusive.

2—34 Foot Trailers—Trucks

Wire Roller—Electric Hoists, etc.

Will sell plant complete or separate lots.

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FOR SALE

Blatt vibrating semi-automatic block machine. 517 cast aluminum 8"x8"x16" pallets for sash, regular, corners. 4" change over. $500.00

MESSING CONCRETE PRODUCTS
R.R. No. 1 Box 31 Moline, Illinois
Phone: Moline—7280

FOR SALE
WOOD ROAD MIXER

New 1948, Model 54, mixed only two weeks, like new

WRITE OR PHONE

JACK McCUTCHEON, Contractor
Dodgeville, Wis.

FOR SALE

Besser Block Machine—Semi-Automatic, In A-1 working condition. Machine improved by easy hydraulic operation. Makes blocks from 4" to 12". All attachments and 3000 pallets included. Machine in operation, inspection invited. Price very reasonable. Selling out because of other business interests.

PINE HILL CINDER BLOCK COMPANY
R.F.D. No. 1 Johnson City, N. Y.

FOR SALE

Completely equipped block plant in operating order can be shipped anywhere. Multiplex tamper with complete efficient hydraulic feed, strikeoff and strip, tamp feet for 4" and 8" block. Dunn 1 bag mixer. Elevator, mixer feed conveyor, 1500 8" pallets, racks, hydraulic lift truck, multiplex ventilated chimney block machine in all respects a complete plant priced for quick sale.

R. S. REED CORP. Three Rivers, Mich.

FOR SALE

Two 50 foot Besser Batch Mixers In Excellent condition

Both 1946 models. Priced right.

Contact either CINDER PRODUCTS CO., Este Avenue, Cincinnati, Ohio, or THE KENT MACHINE COMPANY, Cuyahoga Falls, Ohio.

BLOCK MACHINES FOR SALE

Six Clipper Strippers—$1500.00 ea. All guaranteed to be in first class condition. Thousands of steel and cast-iron, cored pallets.

UNIVERSAL CONCRETE PIPE CO.
Telephone Main 3313
297 S. High St. Columbus 15, O.

TRUCK MIXERS

(Less Chassis)

PROMPT DELIVERY

10—JAEGER 4 YARD

Separate Engine Drive

200 gal. Water Tank

25 gal. Flush Tank

Excellent Working Condition

May be inspected at:

EDWARD EHRBAR, INC.

29 Meserole Ave. • Brooklyn, N. Y.
Evergreen 3-5000

IMMEDIATE DELIVERY: On NEW EQUIPMENT

Model 752 Vi-Brik-Crete with Press Head $725

Model 401 Brickmaker $175

Model 400 Little Dave Brickmaker $105

Add $24.50 for combination slab and chimney block attachments.

12 cu. ft. batch mixers with renewable liners $585.00

Model 500 Blockman hand fork trucks with pneumatic tires $39.50

All prices F.O.B. Three Rivers, Michigan.

Terms 25% Cash with Order Balance C.O.D.

R. S. REED CORP.
Three Rivers, Mich.

FOR SALE

Dumpcrete Bodies

3—2 yds. in excellent condition, clean, ready to mount on truck—with fenders and 12" channels for additional height. Priced to sell.

READY MIXED CONCRETE COMPANY
304 E. 25th St. Owensboro, Ky.

FOR SALE

1½ yd. Rex Low Dump Truck Mixer, in fair condition complete with Waukesha Engine $725.00. FOB Sunnyside, Washington.

Valley Ready-Mix Concrete Company
R.R. and Eleventh Sunnyside, Wash.

FOR SALE

Unused Manufacturers Closeout—138 Block Drying Racks 34"x74½"—48 blocks 3 high with removable metal decks 2½"x2½"x¼" angle upright. $28.00. Each FOB Glendale—Lots of 10 or more. Can be extended to 4 high $7.00 each additional.

C. FREDERICK WOLFE, INC.
74-02 88th St. Tel. DAvenport 6-2860
Glendale Brooklyn 27, N. Y.

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Concrete Pipe Forms. Tongue and Groove 15" 18" 24" and 30" diameter 3 foot length.

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R.R. No. 1 Garrett, Indiana
Telephone No. 617R

ALSO SEE CLASSIFIED ADVERTISING ON OTHER EQUIPMENT IN ROCK PRODUCTS' GENERAL SECTION

FOR SALE

FOR SALE

Joltcrete No. 7 with attachments
4" attachment; 8" attachment; 12" attachment
Pallets: 3000 8"; 2500 4"; 1200 12"
1 Multiplex Flue Machine with pallets
1 Multiplex 12' mixer.

W. B. KILCOIN
Bedford, Pa. Phone 837R-15

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ATLAS CONCRETE FORMS
Walls • Cylinders • Floors • Sewers
Irvington
FORM & TANK CORP.
Irvington, N. Y.

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ANTHRACITE CINDERS

A car load or a train load. Our supply is unlimited. Processed ready to use. Locations on Baltimore & Ohio, Pennsylvania, and Lehigh Valley Railroads. Call or write

ROY P. McMINDES COMPANY
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Phone: Essex 179

PUMICE FOR SALE

FOR SALE
PUMICE BLOCK AGGREGATE

Top quality block aggregate available for carload shipments. New rates East. Write us for further information and rates to your locality.

THE CENTRAL OREGON PUMICE CO.
821 Wall St. Bend, Oregon
Phone 166

COLORS FOR SALE

CEMENT COLORS—Write for samples and prices of **"LANSCO" CEMENT COLORS** in bright shades of RED, YELLOW, GREEN, BLUE, BLACK, BROWN. Manufactured by

LANDERS-SEGAL COLOR CO.
73 Delevan St. Brooklyn 31, N. Y.

CONCRETE BRICK COLORS
CEMENT COLORS
MORTAR COLORS
made by
BLUE RIDGE TALC CO., INC.
Henry, Virginia

AGENTS WANTED

SALES REPRESENTATIVE

Wanted, acquainted with concrete products manufacturers and building material dealers to sell national brand cement and mortar colors on commission basis. Several active territories now open.

Box H-55, Rock Products, 309 W. Jackson Blvd., Chicago 6, Ill.

IDAHO WHITE PUMICE

A car load or a train load. Our supply is unlimited. (Processed ready to use.) This same pumice used in Blocks to obtain Fire Underwriter's B-4 approval.

POCATELLO PUMICE COMPANY
231 W. Center St. Pocatello, Idaho
Phone 555

BUSINESS OPPORTUNITIES

FOR SALE

47 Acre washed sand and gravel plant, with complete cement block plant in connection.

GOSHEN SAND AND GRAVEL
Box 331 Goshen, Ind.

FOR SALE

Dunn Concrete Block Plant—Drain tile, blocks, etc. Steam curing rooms including 2 acres of land and buildings $30,000.00. Plant operating. Business good. In heart of Florida.

Box H-50, Concrete Products, 309 W. Jackson Blvd., Chicago 6, Ill.

FOR SALE

Complete Concrete and Cinder block factory. Land, building, modern equipment with 2,000 block production per day. For quick sale full price $12,500—terms. Westchester and Putnam counties territory. On Main State road and railroad. Has been profitably operated 2 years. Immediate possession. Owner too busy with other interests.

E. L. HOAG
320 Fifth Avenue New York, N. Y.

POSITIONS VACANT

SALES ENGINEERS

Hopper Scales for concrete, chemical and process industries. Exclusive territory. Commission basis. No objection to other line. State background and territory covered. Box H-48, Concrete Products, 309 W. Jackson, Chicago 6, Ill.

FREE SERVICE
for BUYERS

Here is the quick way to get information and prices on machinery and equipment. Just check the item (or items) listed below about which you desire information. Then send this page to us, and we will take care of the rest.

TEAR OFF HERE

- Admixtures, Aggregate
- Aftercoolers, Air
- Aggregates (special)
- Air Compressors
- Air Separators
- Asphalt Mixing Plants
- Bagging Machines
- Bags
- Barges
- Batchers
- Belting, Conveyor, Elevator, Power Transmission
- Belting, V-Type
- Belt Repair Equipment
- Bin Level Indicators
- Bins and Batching Equipment
- Blasting Supplies
- Block Machines Concrete Building
- Bodies, Trailer
- Brick Machines and Molds
- Buckets
- Bulldozers
- Cars, Industrial
- Classifiers
- Clutches
- Coal Pulverizing Equipment
- Concentrating Tables
- Concrete Mixers
- Concrete Mixing Plants
- Concrete Specialty Molds
- Concrete Waterproofing and Dampproofing
- Conveyors
- Coolers
- Cranes
- Crushers
- Derricks
- Dewatering Equipment, Sand
- Diesel Engines
- Dragline Cableway Excavators
- Draglines
- Dredge Pumps
- Drilling Accessories
- Drills
- Dryers
- Dust Collecting Equipment & Supplies
- Electric Motors
- Engineering Service, Consulting and Designing
- Explosives & Dynamite
- Fans and Blowers
- Flotation Equipment
- Gasoline Engines
- Gear Reducers
- Generator Sets
- Grinding Media
- Gypsum Plant Machinery
- Hard Surfacing Materials
- Hoists
- Hoppers
- Kilns: Rotary, Shaft, Vertical
- Locomotive
- Lubricants
- Mills
- Pulverizers
- Pumps
- Scales
- Screen Cloth
- Screens
- Scrubbers: Crushed Stone, Gravel
- Shovels, Power
- Speed Reducers
- Tanks, Storage
- Tractors
- Trucks, Industrial
- Trucks, Mixer Body
- Trucks, Motor
- Vibrators
- Welding & Cutting Equipment
- Winches
- Wire Rope

If equipment you are in market for is not listed above, write it in the space below.

_____

_____

_____

Send to:

Research Service Department

ROCK PRODUCTS

309 W. Jackson Blvd. • Chicago 6, Illinois

Your Name..... Title.....

Firm Name .....

Street .....

City ..... State.....

CP-5

Producing
PERFECT CONCRETE PIPE
with Dependable
"BRANFORD" Vibrators

READY TO POUR

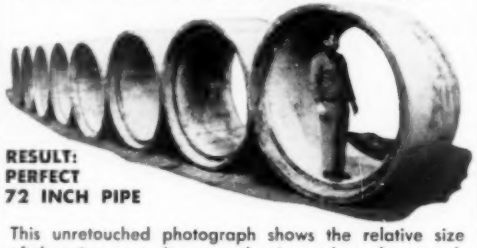
"Branford" vibrators on form preparatory to pouring. This is a typical tongue and groove form for large concrete pipe. Note "Branford" pneumatic vibrator hooked over side handle of this 72 inch pipe form.

VIBRATING WHILE FILLING

While the concrete is being poured, the operator is vibrating the form with a "Branford" vibrator thus assuring a dense, smooth pipe.

POURING THE TONGUE RING

Now the spigot or tongue ring of the form has been placed in position and the tongue is being poured. The worker on the top of the core is placing the last of the concrete. A second worker operates a smaller "Branford" vibrator hooked over the ring. This assures a clean, sharp tongue.



RESULT: PERFECT 72 INCH PIPE

This unretouched photograph shows the relative size of the pipe cast. It cannot begin to show the smooth surfaces and clean sharp corners of this pipe nor its amazing freedom from air bubbles.

The above photographs are used through the courtesy of the Leonard Concrete Pipe Company, Inc., Hamden, Conn., one of New England's largest and most modern pipe plants. Using "Branford" vibrators to replace their previous methods of vibration of this large pipe mould resulted in a smoother, more dense pipe and greatly reduced casting time.

1945 BRANFORD VIBRATORS U.S.A.

We make vibrators for any size pipe. Send us your pipe specifications and we will quote on your vibrator needs.

NEW HAVEN VIBRATOR COMPANY
145 Chestnut Street, New Haven, Conn.

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Yarde's Concrete Tile Co. 130

Another Leader★ IN THE CONCRETE PRODUCTS INDUSTRY PREFERS BESSER VIBRAPACS!

★ This is the 79th of a series of advertisements featuring some of the leaders of the Concrete Products Industry who are today stepping up block production with Besser Super Vibrapacs. Other leaders will be featured subsequently.

The modern plant of Smith Concrete Products, Inc., located on a 5 acre track on U. S. Highway 70, near Kinston, N. C.

C. Kersey Smith, President, discussing Vibrapac block production with plant superintendent, John E. Kelly. Mr. Smith says "I wouldn't sell any other block."

"I Wouldn't Sell Any Other Block"
— Says President C. Kersey Smith

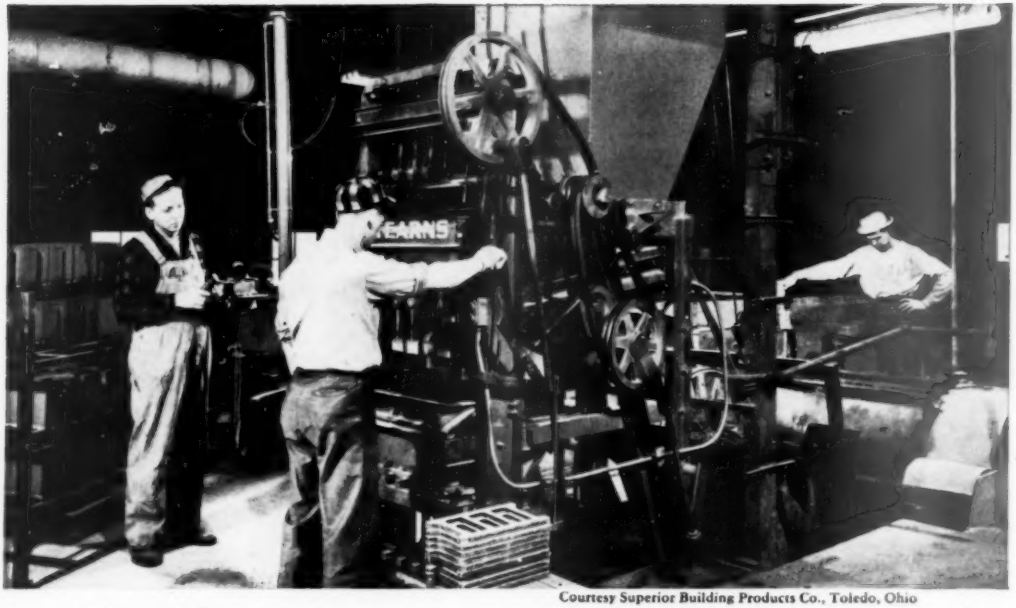
Smith Concrete Products, Inc., of Kinston, North Carolina, has been a Besser Super Vibrapac Operator for several years. The rapid growth of this company is due to its splendid high-speed production facilities and aggressive merchandising methods. Newspapers, signs, booklets and direct mail are used extensively for advertising Vibrapac Concrete Masonry Units. President C. Kersey Smith is proud of his products, which he sells under the trade-name VITA-LITE. Crushed stone, sand and Waylite are used for aggregate.

BESSER MANUFACTURING CO.
Complete Equipment for Concrete Products Plants
115 49TH STREET • ALPENA, MICHIGAN

Interior view of the Smith plant. Shows Besser Super Vibrapac in operation. Fully automatic. No machine operator is required. All sizes of units produced on this machine using the same set of Plain Pallets.

ONE SET of PLAIN PALLETS for ALL SIZES of UNITS

BESSER *Super* VIBRAPAC



Courtesy Superior Building Products Co., Toledo, Ohio

Big Returns from a Small Investment!

STEARNS CLIPPER STRIPPER

POWERED, TAMP-TYPE, CORED-PALLET CONCRETE BLOCK MACHINE

Here's why the four types of Stearns CLIPPER STRIPPER, ranging from the all-power Model A to the manually fed and stripped Model E, continue to *make more profits per dollar invested than any other machine in its price range.*

- **OUTSTANDING EFFICIENCY** — Up to 240 blocks per hour . . . as high as 2000 per day!
- **LOW ORIGINAL COST**—You can start business on a small investment.
- **LOW MAINTENANCE COST**—Simple to install, operate, convert, replace parts. Ruggedly-built CLIPPERS can really "take it!"
- **LOW LABOR COST** — One man can run the CLIPPER. Minimum manpower for entire process from mixing to stacking!
- **FLEXIBILITY**—Adaptable to produce all types of units in block plants of any size.
- **EASY CONVERSION**—Special design and interchangeable parts permit conversion of manually operated to all-power CLIPPERS at any time.

Yes, there's a great difference between knowing and guessing!

MODERNIZE WITH A STEARNS! BACKED BY MORE THAN A QUARTER-CENTURY OF KNOW-HOW

Stearns Consulting Engineers are at your service, free of charge, in planning new or modernizing old plant layouts and selecting, installing and servicing Stearns equipment to increase operating efficiency. Descriptions, specifications, service manuals and prices on request.

STEARNS

MANUFACTURING COMPANY · INC

ADRIAN • MICHIGAN

STEARNS 15

JOLTCRETES

CLIPPER STRIPPERS

MIXERS

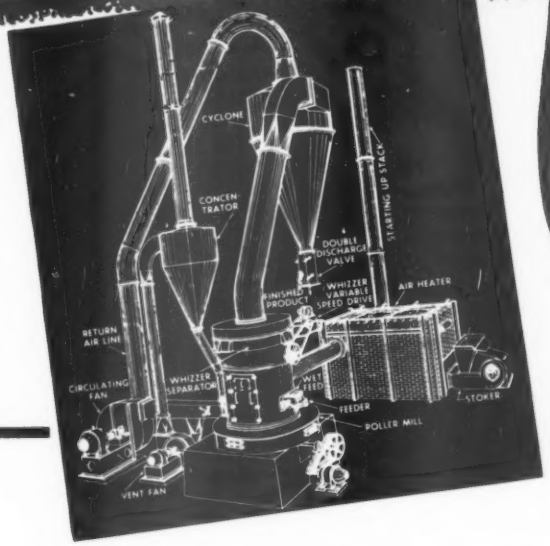
SKIP LOADERS

TURNTABLES

SINTERLITE

Cutting PRODUCTION *Costs...*

with RAYMOND ROLLER MILLS



Typical arrangement of equipment for Raymond Roller Mill with flash drying system.

Combination DRYING and PULVERIZING OPERATIONS:

LIMESTONE...

Evaporating surface moisture from limestone screenings or pre-crushed material and pulverizing to finenesses anywhere in range from 20 mesh up to essentially all passing 325 mesh, for use in coal mine dusting, cattle feed mineral additive, asphalt filler and high fineness filler in other products.

GYPSUM...

Drying and grinding raw gypsum, or pulverizing calcined product, to customary 85 to 90% passing 100 mesh or finer.

CLAY...

Drying and grinding to high percentage passing 100 or 200 mesh, depending on finished product requirements, with removal of moisture during pulverizing process.

BARYTES...

Mill equipped with flash drying to remove surface moisture in raw material as mined, and delivering fine, uniformly classified, finished material.

PHOSPHATE ROCK...

Ideal equipment for grinding... and drying, if necessary... phosphate rock to fineness required for acidulation or direct application to the soil.

THE multiple savings in process time, operating expense, material handling and maintenance, made possible by the *flash-drying-equipped* Raymond Roller Mills, provide a very definite means of cost reduction in the non-metallics field.

As a result, separate dryers and conveyors are unnecessary... less floor space is required... the operation is automatic and dustless... close product control is assured, and today's strict specifications are easy to meet.

If your problem involves drying or pulverizing, or both combined, you can be sure of maximum economies when you use Raymond equipment. Write for details.

COMBUSTION ENGINEERING-SUPERHEATER, INC.

RAYMOND PULVERIZER DIVISION

1307 North Branch Street, Chicago 22, Illinois

Sales Offices in Principal Cities
Canadian Office: Montreal

SINCE 1887

Write for information concerning your grinding problems.

Wise Commercial Operators Turn To...

Baughman

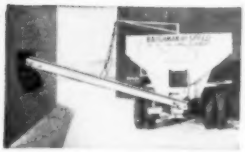
"HI-SPEED" Equipment

The famous Baughman Self-Unloading Body is more than a lime spreader! With low-cost attachments, it spreads phosphate, delivers coal into bins and grain into cribs, transfers loads. Belt model also spreads or unloads road rock, chips, gravel, other abrasives. These specialized services make you money any day of the year!

MORE PAYLOAD! Ruggedly built of high tensile alloy steel . . . 30% lighter, 17% stronger, more abrasion-resistant and 5 times more rust-resistant than if built of ordinary steel. Result: more payload with less dead weight . . . less wear and tear on truck and tires.

Phosphate Spreader attachment covers 2 acres per mile traveled . . . from 100 to 5000 lbs. per acre . . . up to 15 miles per hour. 16½ ft. wide . . . folds for highway travel. Easily attached or removed.

Swivel Conveyor attachment delivers anywhere in a half-circle. Eliminates truck maneuvering. One-man operation — controls at rear of body.



Transport Body. Large in size . . . light in weight for more payload. Baughman Bodies are available in 9 to 33 cu. yd. capacities.

We also invite your inquiry on our conveying and elevating equipment.

BAUGHMAN

BAUGHMAN MANUFACTURING CO., Inc.
451 Shipman Rd., Jerseyville, Ill.

"There is a Baughman Distributor Near You"

FLEXCO HD BELT FASTENERS AND RIP PLATES

FOR HEAVY CONVEYOR AND ELEVATOR BELTS OF ANY WIDTH

Flexco HD Fasteners make a tight, butt joint of great strength and durability . . . distribute the strain uniformly. Operate smoothly over flat, crowned or take-up pulleys. Made of steel, Monel, Everdur and Promal.

Flexco Rip Plates are for repairing and patching damaged belts.

Ask for Bulletin F-100

FLEXIBLE STEEL LACING COMPANY
4684 Lexington St., Chicago 44, Illinois

Strong, Smooth and Readily Troughing.
Order From Your Supply House

One of many Vulcan Diesel-Mechanical Locomotives used by a large cement company for hauling rock from quarries to crushing plants.

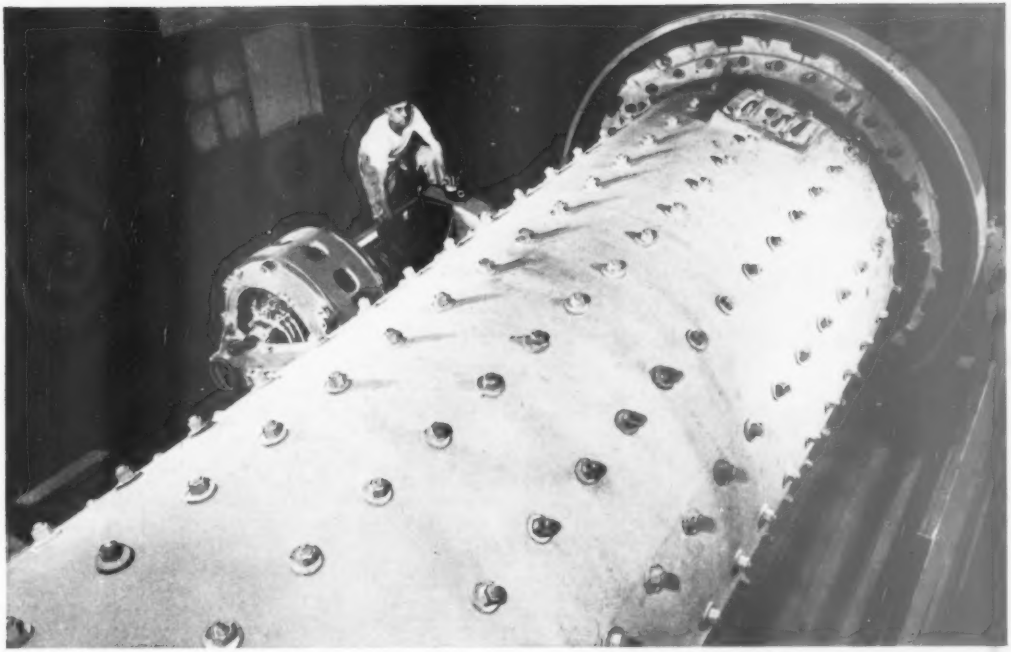
VULCAN LOCOMOTIVES

have been manufactured continuously since 1874 and thousands are now in operation throughout the United States and many other countries. Available in all types—Steam, Fireless, Electric, Gasoline, Diesel and Diesel-Electric—and in any size from three tons to more than 200 tons.

Write us regarding any locomotive requirement. Money-Saving special designs developed, when necessary, without charge or obligation.

1849 VULCAN CENTENNIAL 1949

VULCAN Iron Works
WILKES-BARRE, PENNA.



11 Years Trouble-free Washing With Allis-Chalmers Blade Mill

NEITHER LINERS nor blades have had to be replaced on this 7 by 18 ft A-C blade mill in the washing plant of Blair Limestone Co., Martinsburg, W. Va. No shut-downs since mill was put in production in 1938!

Limestone flux for blast furnace feed is produced here. Specifications are exacting; product must be free of contaminants. This blade mill has 112 internal cast steel blades which wash stone and chips thoroughly clean by *combined cutting and washing action.*

CHECK IMPORTANT FEATURES

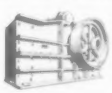
Because Allis-Chalmers blade mills are supported on trunnion bearings instead of rollers, faster speeds and more intensive washing are possible. This mill, for example, revolves more than *twice as fast* as the average roller mounted scrubber. A permanently fixed relationship between gearing and drum is assured.

Shells are heavy, all-welded steel plate. A special seal on feed end bearing prevents backwash of abrasive pulp. Liners and blades are renewable and are available in abrasion-resistant alloy steels.

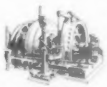
Allis-Chalmers blade mills handle ores and aggregates up to 10 inches in size. Mill diameters are 6, 7, 8 and 9 ft; lengths 10 to 22 ft. Variable speed, pulp level and blade adjustment make possible a wide range of applications in mining and processing.

A trained A-C processing engineer in your area will gladly look over your production set-up and help you select an economical blade mill or other washing equipment. A-C offices or distributors are in principal cities in the U. S. and throughout the world.

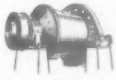
Kilns, Coolers, Dryers



Jaw Crushers



Hoists



Mills

Gyratory Crushers

Vibrating Screens

AND OTHER EQUIPMENT FOR THE CRUSHING, CEMENT AND MINING INDUSTRIES

ALLIS-CHALMERS, 975A SO. 70 ST.
MILWAUKEE, WIS.

A 2655

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

More Dirt Moves Faster When
OWEN BUCKETS
swing over dump trucks

This claim is strongly substantiated by the increasing numbers of excavating contractors who have standardized on Owen Buckets to "Insure a Bigger Day's Work".

Long popular, Owen design and construction characteristics make for consistent "ease of operation" with "A Mouthful at Every Bite" and a clean and rapid discharge.

THE OWEN BUCKET CO. 6040 Breakwater Ave., Cleveland, O.
BRANCHES: PHILADELPHIA • CHICAGO • BERKELEY, CALIF.

---

a Leader

GAYCO
Centrifugal Air Separator

The features embodied in the new model GAYCO Centrifugal Air Separator make them a leading means of increasing the capacity and efficiency of all types of grinding mills. They have quick, positive adjustment. When once adjusted they are not affected by variation in speed or rate of feed.

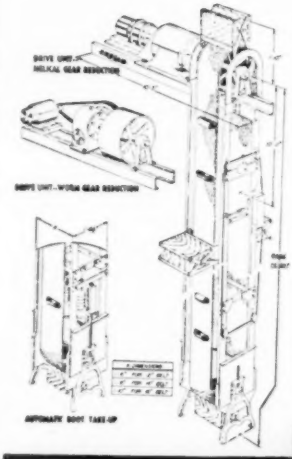
They require very little power to operate. And they feature the exclusive GAYCO principle of rejecting coarse particles by means of a centrifugal sizing fan. They separate 99% through 325 mesh, and give 35% to 50% greater recovery of fines.

● Manufacturers also of "Reliance" Crushers, Screens, Elevators, Conveyors, Bin Gates, Grizzlies. Complete crushing, screening, and washing plants for crushed stone, sand and gravel.

Universal Road Machinery Co.

RUBERT M. GAY DIVISION 117 Liberty St. New York 6, N. Y.
Canadian Representative: F. H. Hopkins & Co., Ltd., Montreal
FACTORY & LABORATORY, KINGSTON, N.Y.

EHRSAM EMPLOYEES ELEVATOR
makes you MONEY



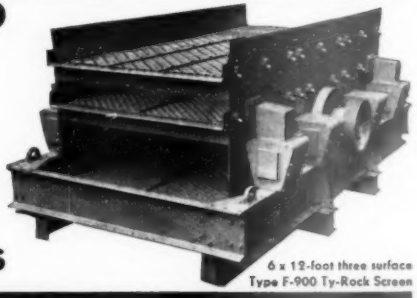
Steps saved . . . money saved. And when you count the steps saved, through use of an Ehrsam elevator, it means a neat profit for you.

Ehrsam Employees Service Elevator is made for 3 widths of belt, 12", 14" and 16" with three types of drive units of either 3, 5 or 7½ horsepower. Special applications for bags and boxes. Installation costs are reasonable. Write today for complete information.

THE J. B. EHRSAM & SONS MANUFACTURING COMPANY
ENTERPRISE, KANSAS

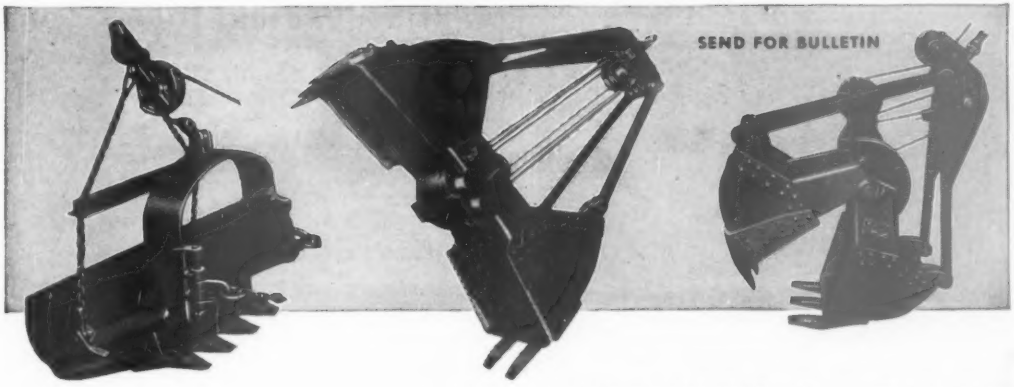
RUGGED **BALANCED**

TY-ROCK
SCREEN
for
HEAVY LOADS—COARSE MATERIALS



6 x 12-foot three surface Type F-900 Ty-Rock Screen

THE W. S. TYLER COMPANY, CLEVELAND 14, OHIO



For Longer Life!

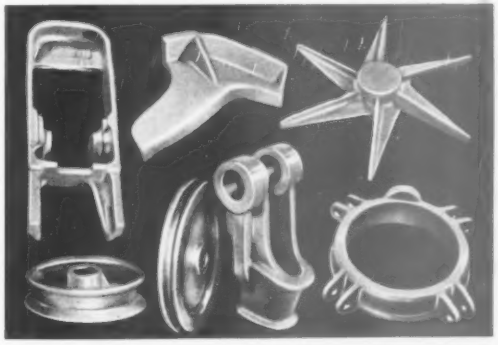
WELLMAN

Williams Type **BUCKETS**

• Count on longer life and more efficient service ... due to Wellman original **welded rolled steel construction.** You get the maximum digging power, and exceptional strength—without excessive weight! Specify Wellman, and you'll specify the best bucket for your purpose.

THE WELLMAN ENGINEERING COMPANY
7025 CENTRAL AVENUE CLEVELAND 4, OHIO

JOIN
11,895
PRODUCERS
WHO
REGULARLY
READ
ROCK
PRODUCTS

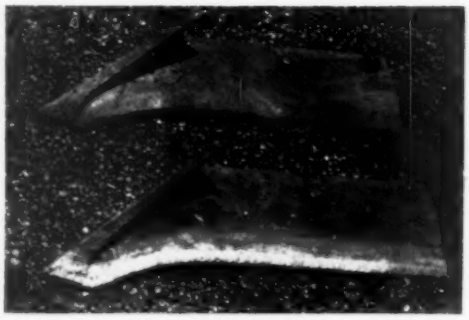


ABRASION-RESISTANT STEEL CASTINGS

A GOOD STEEL CASTING COSTS LESS!

- **LASTS LONGER**
- **PREVENTS BREAKDOWNS**
- **REDUCES SHUT-DOWN TIME**

CALUMETAL **CALUMET STEEL CASTINGS CORPORATION**
1636 Summer Street • Hammond, Indiana

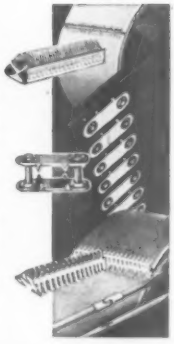


Plow Shares Last 5 Times as Long

when they are treated with wear-resisting alloys. Use RESISTO-LOY when the soil is dry and sunbaked, also if sandy or stony clay loam. ISOROD when the soil is not extremely hard or on steel shares in sandy loam. FARM-ALLOY when chilled cast or cast soft center shares are used in any hard abrasive soils.

RESISTO-LOY CO. GRAND RAPIDS 7, MICH.

ARMSTRONG-BRAY



WIREGRIP Belt Hooks come with extra (patented) blue aligning cards—that assure perfect alignment of hooks—less hook loss and a better job when applied. 6 sizes.

PLATEGRIP Fasteners for . . . Conveyor Belts. Make strong dust-tight joints in belts of any width. Spread tension uniformly. Allow natural troughing of belt. Operate smoothly over flat, crowned or take-up pulleys. Sizes for belts from ¼" to 1½" thick. Easily applied.

STEELGRIP Flexible Lacing, applied with a hammer, clinches over and protects end of belt. Makes strong, flexible joints. Boxed with 2-piece hinged rocker pins or in long lengths.

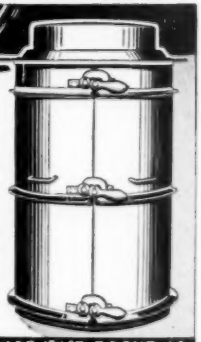
ARMSTRONG-BRAY & CO.
"The Belt Lacing People"
5386 Northwest Hwy. Chicago, Ill.

PERFORATED METAL SAND AND GRAVEL SCREENS

Manufactured exactly to your specifications
Any size or style screen, in thickness of steel wanted with any size perforation desired.
We can promptly duplicate your present screens at lowest prices

CHICAGO PERFORATING CO.
2437 West 24th Place
CHICAGO, ILLINOIS
Canal 1459

THE "Quinn Standard" FOR CONCRETE PIPE



The Quinn Standard is known as the best the world over, wherever concrete pipe is produced and used. Backed by over 35 years' service in the hands of hundreds of Quinn-educated contractors, municipal departments and pipe manufacturers who know from experience that **Quinn pipe forms** and **Quinn mixing formulas** combine to produce the finest concrete pipe at lowest cost.

QUINN HEAVY DUTY PIPE FORMS

For making pipe by hand methods by either the wet or semi-dry processes. Built to give more years of service—sizes for pipe from 10" up to 120" and larger—tongue and groove or bell end pipe at lowest cost.

WRITE TODAY. Complete information, prices, and estimates sent on request.

Also manufacturers QUINN CONCRETE PIPE MACHINES

QUINN WIRE & IRON WORKS 1603 12TH ST. BOONE, IA

U. S. SYNCROGEAR

the motor with multiplied power

Geared to the needs of Rock Product plants

Ask for Bulletin

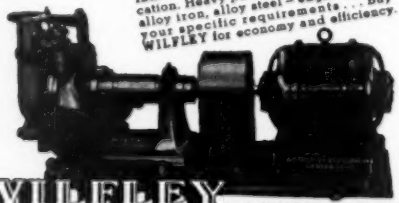
U.S. ELECTRICAL MOTORS Inc.

Pacific Plant
Los Angeles 54, Calif.

Atlantic Plant
Milford, Conn.

Slurries...handled at Lower Cost

Continuous operation without attention. Individual engineering on every application. Heavy pumping parts of rubber, alloy iron, alloy steel—engineered to your specific requirements . . . Buy WILFLEY for economy and efficiency.



WILFLEY centrifugal PUMPS

A. R. WILFLEY & SONS., Inc.
Denver, Colo., U.S.A., New York Office: 1775 Broadway, New York City

HAYWARD BUCKETS

WON'T QUIT OR CAUSE TIME OUT

A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

THE HAYWARD COMPANY
202-204 Fulton Street
New York, N. Y.

CLASSIFIED ADVERTISEMENTS

Single insertion rate $8 a column inch. Larger insertions at lower rates; request classified rate card. POSITIONS WANTED and POSITIONS VACANT (not displayed ads) $1 a column inch an insertion. Terms: Cash with order except for contract advertisers who are billed monthly.

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FOR SALE

CRUSHERS

GYRATORY: 20" Super, McCully; 36" Allis-Chalmers; also Nos. 12, 10, 9, 8, 7½, 6, 5, & 4.
JAW TYPE: 24x36, 25x40, 22x50, 30x42, 42x48, and smaller sizes down to 7"x9".
REDUCTION TY: 2', 3', 4' & Symons Cone; Nos. 19, 25, 27 & 30 Kennedy; 36" Traylor TZ, 1'9" & 2'4" TY; No. 36 Telsmith Gyrasphere; 7 & 10" Newhouse; Stedman 30 & 36" Imp. Type.
ROLLS: Allis-Chalmers 72x30, 54x24, 54x20, 40x15 & 18x10. Pioneer 18x30. Universal 16x24. New Holland 24x16 & 16x16; McLanahan 30"x60", 18x24 & 18x30 Single Roll. Also others.
HAMMERMILLS: Williams Nos. 2, 3, 4 & 6; Pay No. 40 & No. 70; Gruendler 2XB & 3XB; Dixie 2024 & 3650.
MILLS: Hardinge 3'x8", 6'x22", 6'x3', 8'x3' & 8'x4'; Kennedy 4x8, 5x6, 5x11; Marcy 4x5, 6x3; Smidth 16B Tube Mills; Raymond 4 & 5 Roller Mills; Bonnot, Fuller, Sturtevant & others.
CRUSHING PLANTS: 25x40 Cedar Rapids Portable, Diesel Power. Others portable & stationary.
BINS & BATCHERS: 70 & 150 yd., 3-compt., Etc.
TRUCKS: Euclids, FWD, Internationals, Etc.
SHOVELS: 80-D Northwest 2½ yd. combination Link Belt Speeder K-580, 3 yd., and others.
DRAGLINES: 6 Yd. Walker, 145' boom, Diesel Lorain Model 40-A Crane-Dragline, Diesel.

MISCELLANEOUS ITEMS

Barges, Bins, Buckets, Boilers, Cableways, Cars, Compressors, Conveyors, Cranes, Dryer, Derricks, Elevators, Excavators, Generators, Hoists, Kiln, Draglines, Drag Scrapers, Dredges, Drills, Engines, Locomotives, Loaders, Motors, Pipe, Pumps, Rail, Scales, Screens, Slacklines, Shovels, Tanks, Trucks, Tractors, Etc., in many sizes, types and makes at low prices. (I have equipment at many points in the United States and Canada. What you need may be near your plant.)

MARIETTA ALEX T. McLEOD KANSAS

CRUSHERS: 4x40 and 10x20 Austin W.RII. 15x24 Units. 18x30 and 18x32 Telsmith RB. 20x36 Iowa w. feeder. 24x36 and 60x42 Farrell. 40x48 Buchanan and 48x60 Allis Ch. Jaw. 2'7" and 4'8 Kennedy. 14", 16" and 30" Sup. McCully GYR. 2, 3, and 4' Symons Cone. 18x30 Univ. DBL. ROLL. 3 and 5 roll High and Low Side Raymond Mills. ½ yd. Byers Drag. Osgood 200 Cap Shovel comb. ¾ yd. Osgood and Lorain Gas Cranes. ¾ yd. Lorain 40A Diesel and Gas Draglines. 1 yd. Lorain 60 Gas. Bucyrus 102 Diesel Shovels. 1¼ yd. Lorain 75A Gas Shovel. 1¼ yd. Marion 450 Elec. Shovel 440V. 1½ yd. P&H 650 Gas. 655 Diesel Shovels. 1½ yd. NW6 Shovels Diesel Gas. 2 yd. Lorain 82 Diesel Shovel, new 1945. 2—⅜ and 3 yd. NW 50D, 5D and P&H 855 Diesel Draglines. 21 and 25 ton Vulcan std. ga. Steam Locs. 8 ton Plymouth, 12 ton Vulcan std. ga. Gas Locs. 125 HP Gen. Motors Diesel Power Unit 6 cyl. NEW Universal Vib. Screens. NEW "Sturdee" Scales.

MID-CONTINENT EQUIPMENT CO., INC.
6677 Washington Ave. St. Louis 5, Mo.
Ps. 2290

FOR SALE

50 ton Whitcomb diesel elec. locomotive. New 1943. Std. Ga.

1¾ yd. Lima 701 diesel dragline and shovel. 60 ft. bm. Good condition.

¾ yd. Lorain 40 gas shovel-crane-dragline. New 1941.

600 HP Fairbanks Morse 400 KW Model 33 diesel generator set.

Mississippi Valley Equipment Company
513 Locust St. St. Louis 1, Mo.

NORTHWEST CRANE

Model No. 4 with Gantry, 50' boom. Very good working condition and appearance. Presently working on large project in New York City.

EDWARD EHRBAR, INC.
29 Meserole Ave. Brooklyn, N. Y.
Evergreen 3-5000

SCALES—CRUSHERS—VIBRATING SCREENS—CONVEYORS—FEEDERS—IDLERS

Guaranteed Equipment—Immediate Shipment From Large Stocks at Reduced Prices

TRUCK SCALES

15 ton scales	$ 450.00
20 ton scales	510.00
33 ton, 34'x10' scales	1650.00
40 ton, 50'x10' scales	2440.00
40 ton, 60'x10' scales	2890.00
50 ton, 45'x10' scales	2295.00

All scales complete with structural steel weighbridge. Replacement parts for most all makes of scales.

BATCHING SCALES

6000 lb. capacity $ 345.00
All steel scale for any size bin installation.

CINDER CRUSHERS

10 to 20 tons per hour capacity	$ 474.00
25 to 50 tons per hour capacity	1074.00

FEEDERS

15 to 35 ton capacity (per hour of 50 lbs./cu. ft. material)	$ 150.00
28 to 60 ton capacity (per hour of 50 lbs./cu. ft. material)	190.00
50 to 100 ton capacity (per hour of 50 lbs./cu. ft. material)	375.00
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We have approximately 100 machines on the floor, ranging in screening area sizes from 2'x5' to 5'x14' with 1 to 5 decks. Eccentric weight or positive throw eccentric shaft types. Prices range from 395.00

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Troughing—picking tables—Lengths from 10' to 500', widths to 60". If you want to build your own we have all parts including standard sections, head and tail pulleys, belt takeups, drives, idlers, etc.

TROUGHING AND PICKING TABLE IDLERS

All steel construction, no cast-iron, interchangeable with other well-known makes of idlers. Precision ball bearings with alemite fittings. Bearings are replaceable. Shafts run clear through, and no bearing adjustments are required. Easy to start and will run in cold weather. No grease seals, but alemite fittings. Ball races are rust proof; maintenance is negligible.

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16" belt,	$19.00	14" belt width,	$18.50
24" belt,	21.00	18" belt,	20.00
36" belt,	23.00	30" belt,	22.00
42" belt,	24.00		

1-roll Idlers:

30" belt,	17.00	24" belt width,	16.00
42" belt,	19.00	36" belt,	18.00
48" belt,	20.00		

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Drill presses—bench and pedestal grinders vises—portable drills—wood and metal cutting bandsaws—acetylene and electric welding, cutting and burning outfits, etc.

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1—4'x10' Seco Double Deck Vibrator
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- .....Belting, V-Type
- .....Belt Repair Equipment
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- .....Block Machines
- .....Concrete Building
- .....Bodies, Trailer
- .....Brick Machines and Molds
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RP-5

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CARLYLE RUBBER PRODUCTS ARE NEW, GUARANTEED & LOW PRICED

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ABRASIVE RESISTANT COVERS

Width	Ply	Top-Bottom Covers	Width	Ply	Top-Bottom Covers
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42"	5	1/8" — 1/16"	20"	5	1/8" — 1/32"
36"	6	1/8" — 1/16"	20"	4	1/8" — 1/32"
30"	6	1/8" — 1/16"	18"	4	1/8" — 1/32"
30"	5	1/8" — 1/16"	16"	4	1/8" — 1/32"
26"	5	1/8" — 1/32"	14"	4	1/16" — 1/32"
24"	5	1/8" — 1/32"	12"	4	1/16" — 1/32"

Inquire For Prices — Mention Size and Lengths

TRANSMISSION BELTING

HEAVY-DUTY FRICTION SURFACE

	Width	Ply	Width	Ply	Width	Ply
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	16"	6	10"	5	5"	5
	14"	6	8"	6	4"	5
	12"	6	8"	5	4"	4
	12"	5	6"	6	3"	4

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I.D. Size	Length	per Length	Universal Couplings
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	50 "	10.00	1.50 Pair
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	50 "	15.00	1.50 Pair
1"	25 "	10.00	1.50 Pair
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1"	25 "	6.25		50 "	15.00
	50 "	12.50	1½"	25 "	10.00
1¼"	25 "	7.50		35 "	14.00
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2—85KW direct connected Diesel Generating units, each on steel skids. In excellent condition.

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All elect. motors, 24" conveyors, drives, idlers
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Telsmith Feeder
Telsmith Sand Classifier
Telsmith A S Primary Crusher
Nordberg 2' Secondary (fine) Crusher
All necessary timber for plant erection

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1—36" Telsmith Model SB Crusher with 25 HP BB Motor and V-belt drive. Late Model. LIKE NEW! Will sell under factory guarantee.

1—3' Traylor TY fine reduction crusher; short head and special concaves. LIKE NEW!

1—18"x38" Wheeling Roller Bearing jaw crusher; New jaws.

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1—18" Dings Magnetic Pulley and MG set.

1—30 KW 3 phase 440/220/110 V generator d.c. to 65 HP International Mod. UD14 Diesel Engine.

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10-12 ton Standard gauge locomotive, 15 cu. yd. trailer with dump body.

FOR RENT OR SALE

Air Compressors—Used Portable 315, new stationary electric 88 and 60 cfm.
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20 ton Whitcomb gas locomotive
30 ton Plymouth gas locomotive
160 lb. Vt. boiler 54"x8' 5, Nat. Bd.
Barber-Greene Ditcher
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Haiss 77 Bucket Loader
50 HP Clyde electric hoist
½ yd. shovel attach. Bucy-Erie 15-B
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25 ton Browning loco. crane, 50' boom
25 ton Industrial loco. crane-gas
71W Byers Traveler shovel-crane
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¾ yd. Byers Bearcat Jr. crane
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Jeffrey roll crusher, 30x36"

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Immediately Available

5—5'x12' Two Surface Tyrock F-600 Screens. Complete with Motors.

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This Equipment Now Has Never Been Operated

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Los Angeles

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210 Cu. Ft. Gardner-Denver 4 Steel Wheels—Good as new—$2750.00
Gardner-Denver and Chicago Pneumatic Drills—Paving Breakers
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PRICED TO SELL QUICKLY

Machines have seen very little use

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1—Koehring 703 2 yd. Crane
1—Bucyrus-Erie 44B 2 yd. Crane

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100 HP 440 volt 3 phase 25 cycle 375 RPM type KT565 Z General Electric Model 19E90 good condition at $500.00

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Federal Electric 110 volt AC or DC motor driven electric horns or howlers $18.00 each, very loud, order sample. Have large stock of AC 25 and 60 cycle motors, solicit your inquiries.

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FOR RENT

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FOR SALE

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The above machinery must be sold as a complete unit for a price of $65,000.00 f.o.b. Dry Branch, Georgia. Two or four additional Euclids are available at a bargain price.

We also have
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1—E-60 Allis-Chalmers Engine, Serial No 7489-E, Stub, completely overhauled $1,325.00
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The above prices are f.o.b. Macon, Ga.

We have
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This machine is f.o.b. Dry Branch, Ga. All prices and machinery are subject to prior sale or other disposition.

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FOR SALE

HOIST Thomas K, 14"x20" sgle drum.
SCREEN 2'x6' Sgle Deck Vibratory.
CRUSHER SHAFT for 1030 Good Roads Jaw Crusher. (new).
BOX CAR LOADER portable inclined belt conveyor for loading bulk materials.
MOTOR 40 HP 900 RPM West Slip Ring, 220 Volt, 3 Phase, 60 Cycle.

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Plymouth Meeting, Pa.

BUCKET ELEVATORS

Chains: H-78, 83, C-102-B, C-110, C-111, C-188, 114, 522, 527, 730, 822, 825, 835, 1030, 88 and Other Types.
100' No. 844 Chain with 16"x8" Buckets
1500' of C-131 and 2000' of SC-188 Chain
No. 933 New Jeffrey Thimble Steel Roller Chain
800' of No. 825 Chain with 12" Buckets
5"x20" Enclosed type Bucket Elevator
10"x37" Inclined Belt Bucket Elevator
10"x12" Enclosed Bucket Elevators
12"x65' Inclined Spaced Bucket Elevator
12" Bucket Elevator on Double-Strand Chain
10"x32" New Enclosed Bucket Elevator
16" to 6" Bucket Elevators on Belt or Chain
Enclosed, Spaced and Continuous type Elevators
New and Used Belt, Buckets and Sprockets

CRUSHERS

10"x1" Earle C. Bacon Jaw Crusher, No. 2-C
16"x10" A. Farrel-Bacon Jaw Crusher, Blake type
No. 16-10 Gruendler Aristocrat Peerless Grinder
18"x28" 2-roll Heavy Duty Pigment Pulverizer
28" Hammer type Pigment Pulverizer
No. 3-D Allis-Chalmers Gyratory Reduction Crusher
American Pulverizer, type ST-T
40"x12' Pioneer Heavy Duty Roll Grizzly
Kent and Stokes Laboratory type Grinders
Manganese Jaw Plates and Pug Crushers
10"x20" Climax Jaw Crusher

SCREENS

4'x10' 2-deck Seco Vibrating Screen
4'x8' 1-deck Tyler type 400 Vibr. Screen
5'x8' 2-deck Seco Vibrating Screens (2)
5'x8' 2-deck Selectro Vibrating Screen
3'x6' 1-deck Delster "Plat-O" Vibr. Screen
3'x5' Hummer Screens, 1 and 2-deck
1½'x3" 2-deck Niagara Vibrating Screens
New Mechanism for 4' type P-D Link-Belt Screen

CONVEYORS

42"x50' Trough Belt Conveyor
36"x180' New Trough Belt Conveyor
30"x28' Link-Belt "No-Leak" Apron Feeder
30"x7' Link-Belt Apron Feeder, Perforated Plates
30" Belt Conveyors, Antifriction
24"x100' Trough Belt Conveyor
24"x12' Screw-Paddle Gravel Washer
24" and 20" Belt Primers
20" and 18" Flat Belt Conveyors
18"x6½' Apron Feeder
16" Trough Belt Conveyors
15"x150' Single-Strand Flight Conveyor
18" to 6" wide Gravity Roller Conveyors
12" to 6" diam. Screw Conveyors
No. 4 Jeffrey Heavy duty Vibrating Feeder
Jeffrey Vibro-Dryer, 23', 4—No. 4 Feeders
No. 3 and No. 4 Jeffrey Traylor Vibrating Feeders
2 Westinghouse 3-phase 7-hp. Vibrators
Fuller & Raymond Feeders
12"x28' Enclosed Vibrating Screw Conveyor
18"x24' Portable Belt Conveyor, 5-hp. Electric
10"x16' Portable Belt Conveyor, 3-hp. Electric
48"x105' New Standard Wood Apron Conveyor
New and Used Conveyor Belt

MISCELLANEOUS

20' span Maris 3-motor Overhead Crane, 10-tons
1½-yd. Lakewood Clamshell Material Buckets
2-drum Lidg. Electric Hoist, 50-hp. Swinger
Silent Hoist and Crane Co. Car Puller
2-drum Air Hoist and 1-drum Hoists
200-Ampere Electric Transformer Welder
No. 5 McKiernan-Terry Sheeting Hammer
Reeves, Dodge, Link-Belt Variable Drives
Gear Motors, Motors and Engines
60 Selected Sizes of Gear Reducers, to 75-hp.

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136 Colt Street, Irvington 11, N.J.

SHOVELS—CRANES—DRAGLINES

Buc-Monighan 6W Dragline, ¾ yds. Diesel.
Buc-Erie 54B, 2½ yd. Diesel Shovel. Nov. '45.
Buc-Erie 129B. 5 yd. Shovel, electric.
Buc-Erie 37B, 1½ yd. Diesel Shovel.
Buc-Erie 37B, 1½ yd. Diesel Crane, boom 105'.
Lima 1201 High Lift Diesel Shovel.
Northwest No. 6 Diesel Shovel 1½ yd.
Northwest 80D Diesel Shovel 2½ yd.
P&H 1055 Dragline, Diesel, 80' boom. NEW.
P&H 705 Dragline, 2 yd. 70' boom. Diesel.
Lorain 820 Crane, Diesel, 90' boom.
Lorain 79 Diesel Shovel, 1¾ yd.
Lorain 78 Diesel Dragline 75' boom. Diesel.
Manitowoc 2000B Diesel Crane-Dragline.
P&H 1225 2½ yd. Full electric shovel.
Ind. Brownhoist 25 ton Loco. Crane, Diesel.
American 25 Ton Locomotive Diesel Powered.

CRUSHERS

Jaw: Acme 10x20, 14x26, 14x28, 10x42, 16x32, 18x32.
Cedar Rapids 20x36, 25x40.
Farrell 10x20, 13x30, 14x36, 42x40.
Buchanan 30x42. Type C.
Pioneer 24x36 portable with feeder and conveyor.
Traylor 18x36, 24x36.
Austin Western 25x40.
Allis Chalmers 30x18.
Good Roads 10x30.
Telsmith 18x32.
Gyratory: Allis Chalmers-McCully, 6", 7½", 8", 9", 12K, 20", 30"
14" Newhouse, 24" Gyrasphere, 9K, 6K, 5K, gates.
Telsmith 5H, 10-B, 13-B, 16-B.
Kennedy Van Saun 7, 19, 25½-S, 38.
Traylor Tp-1-8.
Roll: Allis-Chalmers 54x24, Diamond 40x22, Pioneer 30x18, Telsmith 24x16, McLanahan & Stone 18x42, New Holland 24x16.
Hammer Mill: Size 4 Williams Jumbo, Pennsylvania SX2, 22x22, Cedar Rapids 20x33, Jeffrey 36x42, Jeffrey 36x24, 36x40 Dixie.
Ball Mill: Allis Chalmers 4'x4', 5'8"x18', Kennedy Van Saun 7'x5'.
Rod Mill: March 2'x6', 3'x6', Allis Chalmers 4'x8' Hardinge No. R 206.
Pulverizer: Williams No. Slugger, Day Model 70.

DREDGES

Morris 10" on steel hull. Elec.
Morris 10" on steel hull. Diesel.
Erie 8" Diesel powered with cutter head.
Bucket Type, steam; 1 yd. bucket.

AIR COMPRESSORS

I-R 1500 CFM, 100 psi. Electric Drive.
I-R 2200 CFM, 100 psi. Electric Drive.
C-P 1930 CFM, 100 psi. Electric Drive.
C-P 1300 CFM, 100 psi. Electric Drive.
Penna. 1300 cfm Direct Connected; elec.
New Penna. 900 cfm; synchronous motor
C.P.T.C 868 cfm; V-belt drive; elec.

WELL DRILLS

I-R "Quarrymaster" drill Cap. 6"x70'.
Loomis 6" blast hole, gas, self-propelled.
Keystone Model 51 Vertical. Complete. Excellent.

TRACTORS

2 Cat. D8, Series 2U-2700 angle dozer DDPCU.
Cat. D8 Series 8R, angle dozer and DDPCU.
Cat. D8 Series 8R, stg. bulldozer DDPCU.
Cat. D7 Series 2T Cable controlled dozer.
Cat. D7 Series 4T Cable controlled dozer.
Cat. D6, New 1945 with hydraulic dozer.
Int. TD-18 Trail Builder angle bulldozer.
Cat. D4 with T4 tractovator 1 yd. bucket.

READY-MIX CONCRETE PLANTS

Heltzel 300 bbl. cement bin with weigh batcher.
Heltzel 100 ton 2-compt. aggregate bin with weigh batcher.
Johnson 192 ton aggregate B-K 300 barrel cement.
Heltzel 300 barrel bulk cement bin.
Johnson Twin Silo bulk cement plant 1044 bbls. complete with interlocking weighbatcher.
Butler 300 bbl bulk cement bin.
Heltzel 100 ton 3 compartment aggregate bin.

ASPHALT AND CRUSHING PLANTS

Madsen Asphalt 3000 lb. cap. Complete.
Cedar Rapids Model B asphalt. Complete; 1 job only.
Cedar Rapids Asphalt Model E 4000 lbs.
Cedar Rapids "Speedline" Asphalt 1000 lbs.
Iowa Model 2A Crushing and Screening.
Universal 800 Crushing Plant, portable on pneu.
Cedar Rapids Pitmaster straight line screening and crushing.
Cedar Rapids Two unit mobile crushing.
Cedar Rapids Model AAA Crushing.

LOCOMOTIVES AND DUMP CARS

8 Koppel 5 yd. 36" Ga. Dump Cars.
10 Western 4 yd. 36" Ga. Dump Cars.
Plymouth 20 ton gas Loco. Std. ga.
Plymouth 12 ton gas Loco. 36" ga.
G.E. 45 ton Diesel-Elec., std. ga.
Davenport 45 ton Diesel-Elec., std. ga.
Vulcan 12 ton gas, std. ga.
2 Porter steam Loco. 12 tons, 36" Ga.
Baldwin 50 ton Steam Std. Ga.
Vulcan 25 ton Steam Loco. Std. Ga.
Plymouth 30 ton std. ga. Gas. Loco.

DERRICKS AND HOISTS

Lambert 25 ton Guy derrick 113' bm.
American Terry 20 ton Guy Derrick 100' bm.
American Terry 20 ton stiff leg with hoist.
American Terry 10 ton steel stiff leg derrick.
Lambert Steel Guy Derrick 20 ton cap.
Morrison 25 ton stiff leg; 105' boom; 3 drum hoist.

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Cortland 7-0723 Cable: RICHWALSH

DEPENDABLE USED MACHINES

Special—Unused Morris 10" sand and gravel pump, about ½ price

Link Belt car puller	Bay City ½ yd. dragline	Pioneer 3x10 screen
Butler Carscoop	Osgood Invader dragline	Bay City ¾ yd. shovel
24x40 port. conveyor	Pioneer 42"x14' feeder	1-4 with Hough shovel
Roadbuilder crane	Bay No. 5 hammermill	Universal truck crane
Link Belt 2½ yd. dragline	American 10" pump	1000 lb. wrecking ball

All above equipment reconditioned in our own plant.

3520 W. 51st St. TRACTOR & EQUIPMENT CO. Chicago 32, Ill.

FOR SALE

CRUSHERS, ETC.

1—No. 4½ Champion (No. 10 Beaumont) Jaw Crusher, 10"x20" opening.
1—No. 4 Champion Jaw Crusher, 9"x15" opening.
2—No. 6 Traylor Gyratory Crushers with T. Z. head.
1—No. 4½ Traylor Gyratory Crusher.
1—Jeffrey Swing Hammer Mill, Type A, 30"x24".
1—18" Link-Belt Apron Conveyor—9" pitch, 27" centers, like new.
1—6" Morris Sand Pump, D.C. to gasoline engine.
1—6" Morris Sand Pump with coupling on bed for motor mount.

Bucket Elevators, open and Totally enclosed, new and used, as is or rebuilt.

JOHNSON & HOEHLER, INC.
P.O. Box 102 Lansdowne, Pa.

Jaw Crushers—4"x8" up to 36"x42".
Crushing Rolls—12"x12" up to 54"x24".
Gyratory Crushers—No. 3, up to No. 12.
Ring Roll Mills— No. 0, No. 1, and No. 2
Swing Hammer Mills.
Rot. Fine Crushers—Nos. 0, 1, 1½ and 2.
Direct Heat Rot. Dryers—3½'x25', 4'x30', 5½'x40', 7'x50',—6x60—6½x60—8'x70'.
Semi-indirect heat Dryers—70"x35', 80" x45'.
Cement Kilns—3' up to 7' diameter.
Hardinge, Marcy & Fuller-Lehigh Mills.
Raymond Mills—Nos. 00, 0, 1, 4 roll.
Tube—Rod and Ball Mills—3' to 7' diameter.
Vibrating Screens—Air Separators.
Lime hydrating plant.
1—7' Newhouse Crusher, Latest Type.
1—9'x170' Kiln.

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Tel. Barclay 7-7298

One new Dodson-McCord 18 cu. ft. cement mixer with one new Dodson-McCord 18 cu. ft. Skip-Hoist. Fully automatic. Has mixed approximately 15 yds. of cement. Ready to go. Cost $2,326.62 will sell for $1,800.00 FOB car or truck.

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Used steel or wood derricks, steel or wood crane hoists, and stone planers. All this equipment in good condition. Send inquiries to Indiana Limestone Company, Inc., P.O. Box 72, Bedford, Indiana.

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DERRICKS, HOISTS, COMPRESSORS
Drills, Steels, Bits
BINS, ELEVATORS, CONVEYORS, ETC.

DRAVO-DOYLE COMPANY
2601 Preble Ave. Pittsburgh 12, Pa.

AIR COMPRESSORS
BELTED: 255, 528, 676, 1000, 1300 and 1570 Ft.
ELECTRIC: 676, 807, 1302, 1722, 2200, 3000, 3700 and 5000 Ft. Cap.
DIESEL: 603, 807, and 1000 Ft.

CRANES—DRAGLINES—SHOVELS
40 Ton American 100 Ft. Boom Whirley Crane
1—1¾ Yd. B.E. 42B Steam Shovel
2—25 and 35 Ton American Loco. Cranes
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17 Yd. Cap. Bucyrus-Erie Elec. Shovel
2—10 Yd. Cap. Marion Elec. Shovels
8 Yd. Cap. Marion Elec. Shovel
7 Yd. Cap. Marion Diesel Dragline
6 Yd. Cap. B.E. Monighan Diesel Dragline
5 Yd. Cap. Marion Elec. Shovel
4 Yd. Cap. Marion Diesel Shovel
5 Steam Shovels—3½, 5, 6 and 8 Yd.

DUMP CARS
46—Koppel, 1½ Yd. 24 and 30 in. Ga., V shaped
15—2 Yd., 3 Yd., 4 Yd., 6 Yd., 12 Yd., 36 in. Ga.
20—Std. Ga. 12 Yd., 16 Yd., 20 Yd., and 30 Yd. Cap.

BOX, FLAT and TANK CARS
75—50 ton Std. ga. heavy duty flat cars
30—8000 gal. cap. tank cars
30—40 ton std. ga. box cars

BALL, ROD AND TUBE MILLS
3'x8", 3'x24", 6'x22" and 6'x48" Hardinge Conical Ball Mills
4'x4' A-C Ball Mill
4x16 and 5½x20 Smidth, 4x18 Bonnot and 5x12 Allis Chalmers Tube Mills
7x18 A-C Dry Compeb Mill
2x6, 3x8, 4x8, and 7x16 Marcy and Hardinge Rod Mills

PULVERIZERS
2 Roll Raymond High Side with Whizzer
Riley, B & W, Strong Scott and Whiting Coal Pulverizers
No. 50 Raymond Imp.
No. 1½ Sturtevant Ring Roll
4 Roll Low Side Raymond

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10,000 Gal., 15,000 Gal., and 20,000 Gal. Cap.
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SEPARATORS and COLLECTORS
3—8 ft., 10 ft. and 14 ft. Gayros

JAW CRUSHERS
6x20, 7x12, 8x10, 8x12, 9x16, 9x36, 10x16, 10x20, 10x30, 10x36, 10x40, 11x18, 12x18, 12x24, 12x26, 13x24, 13x30, 14x26, 15x24, 15x36, 18x30, 18x36, 24x30, 28x36, 30x42, 36x42, 40x48, 42x66, 60x84.

REDUCTION TYPE CONE CRUSHERS
322R Allis-Chalmers
24"x36" Telsmith Gyroenbere
5½ Ft. Symons Short Head
1'-8" and 2'-6" Traylor TY
5", 7" and 10" Newhouse
19-S, 37-S and 49 Kennedy

PRIMARY TYPE—GYRATORY CRUSHERS
10R and 13R Telsmith
14", 16", 20" and 30" Traylor Bulldogs
16", 20" and 30" McCully
Type K, Austin, etc. No. 4, 5, 7½, 9 and 12

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4x20 "XA" and 6x35 "XB" Ruggles Coles
3x30 and 6x55 Christie
Single Shell 4x30, 5x35, 5x50, 5½x40, 6x20, 6x28, 8x35 and 7x28.

STEEL DERRICKS
GUY: 8 Ton 85 ft. Boom, 15 Ton 100 ft. Boom, 20 Ton 115 ft. Boom, 50 Ton 100 ft. Boom
STIFF LEG: 5 Ton 70 ft. Boom, 15 Ton 100 ft. Boom, 25 Ton 100 ft. Boom, 75 Ton 135 ft. Boom

LOCOMOTIVES
GASOLINE: 3, 5, 8, 12, 14 and 30 Ton
STEAM: 9, 20, 40, 60, and 80 Ton
ELECTRIC: 2 Ton, 5 Ton, 8 Ton, 40 Ton
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60 E. 42nd St. N. Y. 17, N. Y.

Marion Type 37—Electric—1¾ yd.; Bu. Er. 37B—Comb. 1¾ yd.; Lima—1201 Dragline—3 Yard. Lima 503 1¾ Shovel and Drag. Others.

Euclids and dump and bottom dump—Tournawagons—Super C tournapulls.

Steam cranes std. ga. Gas or diesel Loco—24, 30, 42 in. ga. Elec. Loco—8t. Ga. 20 Ton. Dump Cars 55 Cu. Ft., 130 Cu. Ft., 16 cu. ft. Ore Cars Std. Ga. 50 tons

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STANLEY B. TROYER
Theatre Bldg. Crosby, Minnesota

FOR SALE
Conveyor 24"x50' channel type
3'x8' Iowa Apron feeder and hopper
4'x8' 3 deck vibrating screen
Extra good 2XXB Gruendler hammermill
International 100 H.P. Diesel engine
Scraper, LaPlant Choate, 5 yd. 2 wh. hyd.
Steam cleaner, Jenz Model 70 portable

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FOR SALE BY OWNER
NEW HEAVY INDUSTRIAL MACHINERY

1—9'6"x11'0" Ball Mill Complete
2—700 HP Slow Speed Synchronous Motors Complete with Switch Gear
5—450 HP Slow Speed Synchronous Motors Complete with Switch Gear
4—14' Air Separators complete with extra liners
10—Modern 4-tube Packing Machines Complete
28—Bin Feeders
4—4'0"x6'0" Hum-mor Electric Screens
Available for immediate delivery.

For prices and additional information on the above listed items and other unlisted items contact

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20 Tons Belgian flint pebbles
4'x16' Tube mills (3)
1—American pulverizer with 125 HP direct connected motor
1—70 HP Marine type diesel engine, same as new.
1—3 Drum Bucyrus steam hoist
All steel dredge boats, scows, tug boats and pug boat
Electric motors AC from 1 HP to 300 HP
Link Belt pan conveyors, 36"x22' centers
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Richardson automatic scales
Air compressors
4" and 5" Cement circulation pipe
Steel bins, hoppers and tanks
Fulley-Kinyon pump (6")
6'x50' Manitowac dryer
4 Wood hoppers lined with steel
Elevators with casing and double chain
B & W coal pulverizer
Steel buildings: 20'x100', 75'x350' and 50'x350'
One industrial property in desirable location, water power, railroad and highways and good labor conditions. Also lake frontage on many desirable lakes.

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P.O. Box 688
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Jaw Crusher 9x20; 40 ft. chain, bucket elevator; 3'x6'—3 Deck Vibrating Screen; Mundy Hoist—with gas—50 H.P. Waukesha; 24 inch Stedman Impact crusher—pract. new; No. 5 Telsmith Sand Tank.

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Logan County

FOR SALE
CEDAR RAPIDS UNITIZED STONE CRUSHING PLANT
Consisting of:

1—Cedar Rapids Model AAAA Primary Unit, 25"x40" opening including Apron Feeder and Undercrusher Conveyor, mounted on truck frame less axles and tires. Powered by ME46 Murphy Diesel.
1—Cedar Rapids Model BBB Scalping Unit composed of 4'x10' Vibrating Screen and 10"x36" Jaw Crusher and Undercrusher Conveyor. Mounted on truck frame including Air Brakes, Tandem Rear Axle and Front Pony Assembly, no tires (uses ten 9.00x20 tires). Powered by ME4 Murphy Diesel.
1—Cedar Rapids Model CCC Secondary Unit composed of 40"x24" Rolls (segmented, new) and 2½ deck 4'x12' Screen, Feed Conveyor, Reject Conveyor, Elevating Wheel and Truck Undercrusher Conveyor. Mounted on steel truck frame, no axles, wheels or tires. Powered by ME650 Murphy Diesel.

This plant may be seen in operation in Central Pennsylvania. It is less than two years old, and in excellent working condition. It is now crushing stone, but is also ideal for gravel plants.

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The services of 14,001 salesmen all with 51 years experience selling your machinery to the producers in the non-metallic minerals field.

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Guarantee — to call on 27% more potential buyers than anyone else serving the industry.

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BOILERS: 1—40,000 lbs steam per hour, water tube, self-contained, oil fired, 300 lbs. pressure. 1—100 H.P., 90 lbs. pressure, complete with oil burner and control equipment, portable.

COMPRESSOR: Schramm, 420 electric, capacity 450 CFM, 75 H.P. motor, V-belt drive.

DRAGLINE: 4 yd. capacity, 110′ boom, 2200 volt A.C.

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M. G. SET: G.E. 3 phase, 60 cycle, 220 volt, 20 H.P., D.C. generator, 12 KW, 125 volts, with push button compensator.

GOODRICH SUPER LONG LIFE CORD CONVEYOR BELT (NEW): Large quantity of Goodrich Belt 42" wide, 6 ply, 42 oz. duck, 7/32" top cover, 1/16" bottom cover, on original reels, all NEW, NATURAL RUBBER, with or without mechanical parts.

MOTOR: G.E. 40 H.P. 3 phase, 60 cycle, 220-440 volt, 1765 RPM, with V-belt pulleys and belts, starter, etc.

GYRATORY CRUSHERS: All sizes and types.

JAW CRUSHERS: All sizes and types.

REDUCTION CRUSHERS: All makes, various sizes.

ROLL CRUSHERS: Jeffrey 18x24 double Roll Crusher for coal, coke, cinders, etc. Allis Chalmers 54x20", NEW condition.

HARDINGE MILL: Conical Ball Mill 6′x22", manganese steel lined, Herringbone gears, with motor and V-belt drive.

KILNS, COOLERS, DRYERS: 1—Single Shell Dryer 34"x29 ft., complete with drive, burner; no motor. 1—5′x50′ brick lined Kiln. 1—10′x90′ Kiln or Dryer, ⅝" plate, NEW condition.

DERRICK HOIST: National 3 drum, 80 H.P., shop No. 4636, with 15 H.P. separate electric swinger, 3 phase, 60 cycle, 220/440 volt.

MINE HOISTS: Double drum 150 H.P., single drum 250 H.P., 400 H.P., 600 H.P., 800 H.P., 900 H.P. and 1000 H.P.; 3 phase, 60 cycle, 2200 volt, all complete with controls.

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Phila. Phones: Madison 8300—8301
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1—½ yd. Page Dragline Bucket R.H. New
1—315 cu. ft. Davey Gas Portable Compressor
1—¾ yd. Link Belt Model 75 Gas Shovel and Crane
1—¾ yd. P&H 255A Gas Shovel and Crane
1—1¼ yd. Northwest No. 6 Diesel Shovel
1—80-D Northwest Diesel Shovel
1—MC-4 Lorain Motor Truck Crane. 1944
2—10-ton American Terry all steel stiff leg Derricks
1—25-ton American Diesel Locomotive Crane New 1942
1—30-ton Ohio Diesel Locomotive Crane. New 1946
1—40-ton Orton Diesel Loco. Crane. New 1941
1—30-ton Plymouth Std. Ga. Gas. Loco. 1943

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CORE DRILLING
—anywhere!
"We look into the earth"
PENNSYLVANIA
DRILLING COMPANY
Pittsburgh 20, Pa.

—BUSINESS OPPORTUNITIES—

Complete crushing outfit—including washer also—Marion shovel. D4 Cat—8 dump trucks Ford loader —Life time supply of gravel from river. Also rock pit. 150 acres land—40 acres of timber—Barn—five cabins—Public picnic spot, large dance hall—material for large house (pumice blocks and lumber) —4 miles from Longview and 3 miles from Kelso, Wash.

CRYSTAL POOL SAND & GRAVEL CO.
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ROCK WOOL AND LIME PLANT 18 miles from Bham, Ala. Bad health reason for selling or leasing.

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LIMESTONE QUARRY
SALE OR LEASE

Located near Fremont, Ohio. Excellent opportunity. Unlimited market. Convenient terms.

Mrs. S. A. Swint Mansfield, Ohio
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Sand and gravel plants, land and equipment. Excavating and grading business. Located between Philadelphia and Washington, D. C. Gross income 1948, $300,000. Will sell for $225,000. Terms 1/3 down and 1/3 each year.

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Rock Plant and land complete—going business in desirable Southern California location.
(250 tons per hr.)
Asphalt Plant—transportation equipment transit mix trucks and batching equipment.

Write Box H-58, Rock Products, 309 W. Jackson Blvd., Chicago 6, Ill.

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WANTED MAY 1st

Engineering Graduate, qualified to direct aggregate production in Northwest in connection with large dam project. Deposit located 60 miles from town of any consequence. Must be aggressive and able to supervise project accounting, purchasing, and labor relations. Right man can be built up with this experience as valuable asset to our organization.

Write Box H-41, Rock Products, 309 W. Jackson Blvd., Chicago 6, Ill.

POSITION VACANT

Superintendent for a Sand and Gravel Plant in the middle west. State age, education, experience, references and salary expected. Box H-47, Rock Products, 309 W. Jackson Blvd., Chicago 6, Ill.

WANTED: General Superintendent and Quarry Foreman with granite experience. Two year job in Southeast. State salary and experience. Box H-49, Rock Products, 309 W. Jackson, Chicago 6, Ill.

— POSITION WANTED —

Experienced in design, erection and operation of cement plants. Wet and dry process. Foreign service preferred. Box H-52, Rock Products, 309 W. Jackson Blvd., Chicago 6, Ill.

— EQUIPMENT WANTED —

WANTED
USED
PRIMARY JAW CRUSHER

with an overhead eccentric shaft and forced feed. Jaw opening must be approximately 20" x36". Advise make, model, year in which manufactured, horse power requirements, general condition of machine, gross weight and price.

McCURTAIN LIMESTONE CO.
664 N. Michigan Ave., Chicago 11, Ill.
Tel.: Superior 7-5048

WANTED

Rotary Kilns: Size 11′, 10′, 9′, 8′, 7′ and 6′ dia. 100′ or longer.

Compeb mills: 6′ and 7′ dia.
Tube mills: 5′, 6′ and 7′ dia.
Steel tanks ¼" plate 14′x26′.

OLLIE E. LAWRENCE
P.O. Box 688
Quincy, Michigan

WANTED TO BUY

Used hammermill or impactor: capacity close to Pennsylvania Hammermill size C-5-30. Also, used motor and controls for same—220 volts, 3 phase, 60 cycle. Advise age, condition and best cash price. Also, chain elevator, 14"x7" buckets, 64 feet from bottom of elevator pit to bottom of discharge chute. This must be in first class condition.

YORK STONE & SUPPLY CO.
Roosevelt Ave. York, Pa.

WANTED TO BUY

1—Cement Bin 300 barrel capacity complete if possible—also 100 ton 3 compartment aggregate bin not too fancy

GRAYSTONE TILE
408 River Rd. Modesto, Calif.

WANTED

6′ and 8′ dewatering tanks and cones, 6" pipe and couplings and other equipment necessary for hydraulic mining of sand.

CLECKLEY & McGEE, INC.
Orangeburg, S. C.

CONSULTING ENGINEERS

J. C. WITT CONSULTING ENGINEER CHICAGO
583 Stony Island Avenue
"—from Raw Materials Deposits to Concrete in Place."
PLANT DESIGN, PLANT OPERATION, EXPERIMENTAL ENGINEERING, RESEARCH.
Fellow, American Society of Mechanical Engineers
Member, American Society of Civil Engineers

Quarries
Crushing Plants
Cement Plants
Storage Methods
Operating Costs

E. LEE HEIDENREICH JR.
Consulting Engineers
67 Second Street, Newburgh, N. Y.
Phone 1828

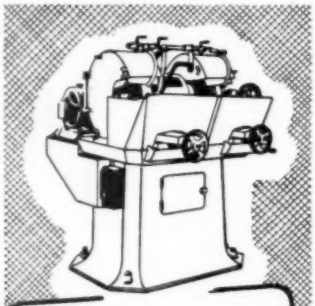
Operation
Plant Layout
Design
Appraisals
Construction

New FARREL-BACON
CRUSHER
has many advantages

Design features of this 36 x 30 E stone crusher include: (1) Meehanite frame, sectionalized when necessary; (2) removable water cooled bearings; (3) improved design of swing jaw bearing; (4) force-feed oil lubrication, or circulating system if desired; (5) split flywheels; (6) flat or V-belt drive.

Write for further details or engineering help. BA-1

FARREL-BACON
ANSONIA, CONNECTICUT



MASSCO ROCK BIT GRINDERS

Heavy duty (wt. approx. 2000 lbs.) for high speed and efficiency in resharpening all makes of removable rock drill bits. Coolant applied from above and below safeguards against burning bits. Gauge grinding head rotatable—grinds all clearance angles on plain face wheel without dressing for different angles. Other types for the smaller operator. Bulletin on request.

MINE & SMELTER SUPPLY CO.

Denver Salt Lake City El Paso
1775 Broadway, New York

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HETHERINGTON & BERNER

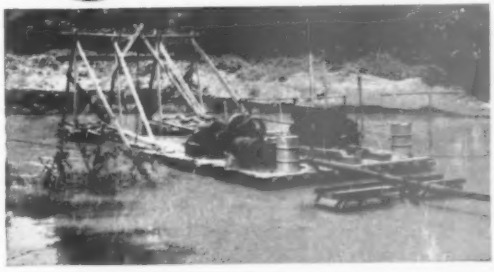
with wear-resisting semi-steel or manganese parts

H & B sand and gravel pumps are built in two general types: STANDARD (in 4″, 6″ and 8″ sizes) for use under ordinary working conditions and moderate heads, and DREADNAUGHT (in 6″, 8″, 10″, 12″ and 15″ sizes) for the tough, heavy-duty jobs with stringent head conditions. These performance-proven pumps are available promptly with either semi-steel or manganese parts.

Special bases and variations of drive arrangement may be had to meet special requirements. Your inquiries on pumping problems will have the prompt attention of H&B engineers, who have had many years of specialized experience solving such problems. Write for Bulletin DP-147.

HETHERINGTON & BERNER INC.
717 Kentucky Avenue, Indianapolis 7, Indiana

Illustration shows an H & B pump installation in a typical small pit operation.



Dorothy Lamour says . . .

"I like The Shamrock because . . .

You'd think that after playing so many screen parts in a sarong I'd be at home only 'neath a coconut palm. Well, nothing could be further from the way I feel. I revel in the luxurious comfort of a hotel like The Shamrock. I like the restful appeal of its interior designing . . . the thrilling atmosphere of the dining and ballrooms. I enjoy the excitement of a night . . . or a long series of nights . . . among people who come to The Shamrock from all over the nation; yes, celebrities and just plain folks . . . I like to be with them all. I like The Shamrock because it does so much for you to make life there a wonderful adventure."

In Houston, you are cordially invited to live at

The Shamrock

A GLENN McCARTHY ENTERPRISE

• *Single rooms from $6 up*

Above photos show New Holland Double Impeller Breaker installation at Hudson Stone Products Company; also . . . actual size material as it comes from delivery conveyor before screening. Notice uniformity of shapes and sizes. This is the result of "Dual Impact" action! Breaking force evenly distributed assures accurate sizing without irregular shapes—even with slabby material!

In limestone...

"Crush more material to desired size with less power."...

says
TOM HUDSON, owner, Hudson Stone Products Company, Lynchburg, Ohio

● Early in 1947, Tom Hudson modernized his plant. He replaced three units with a single New Holland Model 3030 Double Impeller Breaker.

From the layout of his plant which is indicated above, you can easily see what Mr. Hudson means when he says . . .

"A one-crusher plant can be successfully built around this crusher (the New Holland Double Impeller Breaker) . . . which permits a minimum of other equipment . . . contributes materially toward low maintenance."

In pits and quarries all over the world, "Dual Impact" action is producing outstanding results.

The record is the same . . . higher production at lower cost . . . in limestone, basalt, granite, gravel, and many other types of stone.

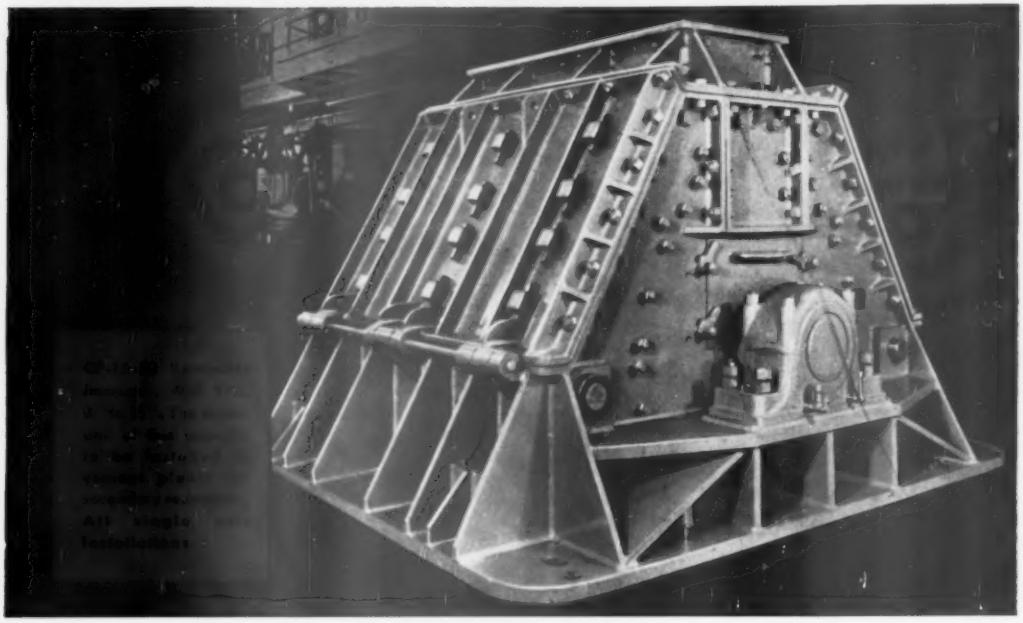
New Holland Double Impeller Breakers are available in four sizes—1212, 2020, 3030, 5050—to meet your requirements. They can be adapted easily to either an open or a closed circuit.

Whatever your crushing problems—bring them to New Holland engineers. They will help you as they have helped so many other operators. Write Department R-59 today.

NEW HOLLAND DOUBLE IMPELLER BREAKERS

NEW HOLLAND MANUFACTURING COMPANY, MOUNTVILLE, PA.

"PENNSYLVANIA" STEELBUILT



CRUSHERS for ORES, ROCK and INDUSTRIAL MINERALS

For more than half a century "Pennsylvania" has specialized in engineering and building crushing equipment exclusively . . . in a number of types, for various applications and in capacity ranges to meet all requirements.

Hundreds of "Pennsylvanias" are now serving the Mining Industries . . . for primary, secondary and finer reductions of Ores, Sinters, Refractories, Cement Making Materials. Limestone, Gypsum Rock and a wide variety of abrasive materials, including Flint Rock, Silica Sand and others. Specialized types of "Pennsylvania" Crushers are available also for scavenging refuse materials from and crushing and sizing bituminous coals, also for reducing chemical solids to free-flowing granular products.

Our pilot plant tests closely reflect commercial operations. Let us help you with your crushing problems.

- **SINGLE ROLL CRUSHERS.** For primary and secondary reductions . . . limestones, gypsums, chemicals, cement making materials, etc.
- **IMPACTORS.** Reversible Rotation. The crusher that reduces by direct impact at controlled slow speeds. Produces particles cubical in shape, uniform in size. For high silicas, clinkers, slags, ores, furnace refractories, limestones, gypsums, chemicals, etc.
- **HAMMERMILLS.** Central feed and Reversible Rotation Types. Many sizes. For preparing a wide range of industrial minerals, coals, limestones, gypsums, chemicals, etc.
- **GRANULATORS.** Slow Speed Ring Type Crushers. For preparing limestones, gypsums, etc. with minimum overgrinding. Also for industrial steam and domestic stoker coals and non-abrasive stones and chemicals.
- **BRADMILLS.** Combination primary and secondary crushers with continuous screening, for granulating and sizing plastics and other chemicals, making domestic stoker coals and other applications. Wide range of capacities.